National Park Service
U.S. Department of the Interior

Bighorn Canyon National Recreation Area

Wyoming and Montana

Integrated Weed Management Program

Environmental Assessment
January 2004

Environmental Assessment

Integrated Weed Management Program

Bighorn Canyon National Recreation Area
Bighorn and Carbon Counties, Montana and Bighorn County, Wyoming

SUMMARY

PUBLIC COMMENT

If you wish to comment on the environmental assessment, you may mail comments to the name and address below. Our practice is to make comments, including names and home addresses of respondents, available for public review during regular business hours. Individual respondents may request that we withhold their address from the record, which we will honor to the extent allowable by law. **If you wish to withhold your address, you must state this prominently at the beginning of your comment.** We will make all submissions from organizations or businesses and from individuals identifying themselves as representatives or officials of organizations or businesses, available for public inspection in their entirety.

Please address comments to:

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PURPOSE AND NEED

PURPOSE

Bighorn Canyon National Recreation Area was established by an act of Congress (Public Law 89-64, 16 USC 460t) on October 15, 1966 “to provide for public outdoor recreation use and enjoyment of Yellowtail Reservoir and lands adjacent thereto … and for the preservation of scenic, scientific and historic features contributing to public enjoyment of such lands and waters.”

The significance of Bighorn Canyon National Recreation Area lies in the scenic and recreational values of Bighorn Lake and its canyon. The park has a history of over 10,000 years of human use from prehistoric and historic Native American use to ranching, mining, irrigation and recreation from the 1880’s through the present. It is home to the Pryor Mountain Wild Horses with a third of the Pryor Mountain Wild Horse Range being located on Bighorn Canyon National Recreation Area lands. Additionally, much of the wild horse range is shared with a population of Rocky Mountain bighorn sheep that is relatively isolated from domestic sheep. The Park is situated at the northern end of the Great Basin Desert and provides a unique natural environment with the meeting of the desert with the Rocky Mountains and the Northern Great Plains. This gives the Park tremendous diversity in its biotic communities in spite of the years of human use (see Figure 1). The Park’s enabling legislation defines it’s primary purposes as being 1) to provide for public outdoor recreation use and enjoyment of Bighorn Canyon, the Yellowtail Reservoir and adjacent lands and 2) protect, restore and maintain the natural and cultural resources while managing them within their broader ecosystem and cultural context.

Weed control is considered to be critical part of management of vegetative communities to enhance biodiversity and maintain the native species that were there before disturbance and weed invasion. The primary goal of any weed management program is not just to kill weeds, but rather to restore or enhance native plant communities. To accomplish this goal, the objectives of the integrated weed management program are: (1) develop and maintain an inventory of known and new noxious weed infestations (inventory and mapping), (2) prevent further noxious weed dissemination, (3) control or contain weed infestations using an integrated pest management (IPM) approach (biological, mechanical, cultural, and chemical controls), (4) minimize negative impacts to surrounding native fauna and flora and (5) manage weed infested native plant communities in a manner that enhances the ecological health and long-term sustainability of these communities. Use of an IPM approach does not exclude the use of chemical control measures (e.g. herbicide use) in the management of weeds, but instead promotes the use of multiple tools in order to minimize the amount of chemical use required to successfully control weed populations.

PROGRAM NEED

Bighorn Canyon National Recreation Area has a long history of previous and ongoing human-related disturbances. More recent disturbances related

to ranching, the reservoir, cattle trailing, mining and recreational use of park lands has led to the establishment of a variety of alien plants that are classified as either noxious weeds or as weedy pests. The management and control of invasive non-native species has been identified as a high priority issue within the National Park Service (NPS) and is specifically, under the Government Performance and Results Act of 1993, identified as an accountable goal for all national park units. Executive Order 13112 signed on February 3, 1999, further obligates all federal agencies to address the significant economic and biological threats posed by nonnative species.

Specifically, weed management and control actions are needed within Bighorn Canyon National Recreation Area to: (1) reduce the replacement of native plant species by weeds, (2) to prevent the loss of native habitat and forage for wildlife species, (3) maintain native biodiversity and ecosystem health, (4) prevent negative changes in the physical, biological and chemical parameters of native soils and (5) enhance the visitor experience through improved aesthetics and interpretation of the natural and cultural landscapes within the park .

The scope of this Environmental Assessment is limited to the (1) control of noxious weeds in natural areas, (2) control of weedy pests on roadsides, lawns, visitor use areas and right of ways and (3) control of alien annuals around the historic ranches (see Appendix E for more specific information on targeted weed locations). Areas proposed for inclusion in the park's Integrated Weed Management Program will include the entire park north of Kane Cemetery in the Yellowtail Habitat including the North District and the Mason-Lovell Ranch. The environmental assessment does not include the lands within the Yellowtail Habitat South of Kane Cemetary (see map). The excluded part of the Yellowtail Habitat contains complex and extensive mixed infestations of Russian knapweed (Acroptilon repens), tamarisk (Tamarx chinensis), whitetop (Cardaria pubescens), Russian olive (Elaeagnus angustifolia) and Canada thistle (Cirsium canadensis) that have not yet been mapped and that will require development of an integrated weed management approach that incorporates other agencies working with weed management in the Bighorn Basin.

In order to address the above identified legal mandates and park specific objectives, Bighorn Canyon National Recreation Area is proposing the development of an integrated weed management program that includes implementation of prevention, education, cultural, mechanical, biological and chemical control activities. Additionally, revegetation actions will be utilized as needed in weed control areas to assist in meeting desired or targeted native plant community establishment.

SCOPING

Scoping is an early and open process to determine the breadth of environmental issues and alternatives to be addressed in an environmental assessment. Bighorn Canyon National Recreation Area has conducted both internal scoping with appropriate National Park Service staff and external scoping with the public and affected groups and agencies.

Internal scoping was conducted by the staff of Bighorn Canyon National Recreation Area and resource professionals of the National Park Service's Denver and Santa Fe support offices. This interdisciplinary process defined the need, determined what the likely issues and impact topics would be, and identified the relationship, if any of the proposed action to other planning efforts in the monument.

A news release describing the proposed action was issued on January 15, 2002 (see Appendix A). Copies of the Scoping Statement and cover letters (See Appendix B) were also sent to associated agencies including local county Weed and Pest agencies, the State Historic Preservation Office of Montana, local BLM offices, Montana Fish Wildlife and Parks and Custer National Forest. Comments were solicited during the external scoping until February 15, 2001. The suggestions from the external scoping were incorporated into the environmental assessment.

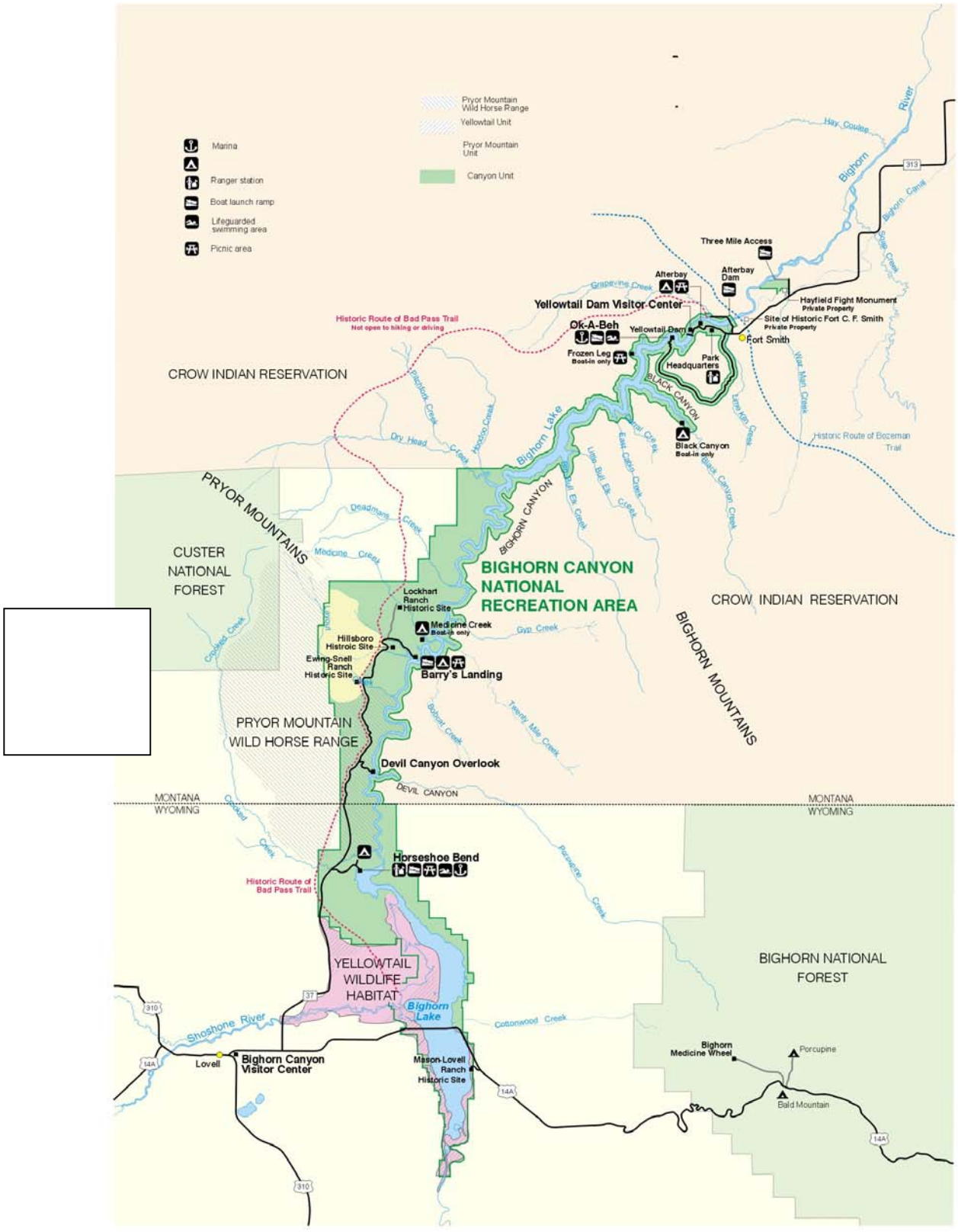
The undertakings described in this document are subject to Section 106 of the National Historic Preservation Act, as amended in 1992 (16 USC 470 et seq.) The proposed plan was discussed with two NPS archeologist/ historians during its inception and with Montana SHPO and Wyoming SHPO. A Section 106 statement was submitted to the Wyoming and Montana State Historic Preservation Offices for review and comment, to fulfill Bighorn Canyon National Recreation Area's obligations under Section 106(36 CFR 800.8[c], Use of NEPA process for section 106 purposes)

RELATIONSHIP OF THE PROPOSED ACTION TO PREVIOUS PLANNING EFFORTS

The integrated weed management program is consistent with the objectives of Bighorn Canyon National Recreation Area's Resource Management Plan (1995) as well as the Bighorn Canyon Strategic Plan, 2001-2005(2001).

IMPACT TOPICS

Issues and concerns affecting the proposed action were identified by specialists in the National Park Service as well as by the staff of the Weed and Pest Offices of Park and Bighorn Counties. Specific impact topics were developed to ensure that alternatives were compared on the basis of the most relevant topics. The following impact topics were identified the basis of federal laws, regulation, Director's Orders, *NPS-77 Natural Resource Management Guide*, 1991 and the National Park Service *Management Policies 2001*. A brief rationale for the selection of each impact topic is given below, as well as the rationale for dismissing specific topics from further consideration.



Map of Bighorn Canyon National

Recreation Area
IMPACT TOPICS ANALYSED IN THE ENVIRONMENTAL ASSESSMENT

Cultural Landscapes*:* The National Historic Preservation Act, as amended in 1992 (16 USC 470 *et seq*.); the National Environmental Policy Act of 1969 (42 USC 4321 *et seq*.); and the National Park Services Director's Order #28, *Cultural Resource Management Guideline* (1997), *Management Policies 2001* (2000) and Director's Order #12, *Conservation Planning, Environmental Impact Analysis, and Decision Making* (2001) require the consideration of impacts on cultural landscapes listed for or eligible to be listed in the National Register of Historic Places.

Cultural Landscapes: According to the National Park Service's *Cultural Resource Management Guideline* (DO #28) a cultural landscape is:

> … a reflection of human adaptation and use of natural resources and is often expressed in the way land is organized and divided, patterns of settlement, land use, systems of circulation and the types of structures that are built. The character of a cultural landscape is defined both by the physical materials, such as roads, buildings, walls and vegetation, and by use reflecting cultural values and traditions.

Thus, cultural landscapes are the result of the long interaction between man and the land, and the influence of human beliefs and actions over time upon the natural landscape. Shaped through historical land-use and management practices as well as politics and property laws, levels of technology and economic condition; cultural landscapes provides a living record of an area's past, i.e. a visual chronicle of its history. However, the dynamic nature of modern human life contributes to the continual reshaping of cultural landscapes. This makes them a good source of information about specific times and places, but at the same time their long-term preservation is a challenge.

Bighorn Canyon National Recreation is rich in cultural landscapes reflecting over 120 years of ranching, tourism and irrigated agriculture. The traditions of ranching continue today with cattle trailing and grazing in the park as well and the presence of part of the Pryor Mountain Wild Horse Range in the southern unit of the park. The historical practice of impounding rivers for irrigation and flood control in the arid lands associated with the Bighorn Canyon region led to the creation of the Yellowtail Dam and the National Recreation Area.

It is because of these historic land uses and ongoing cultural practices that Bighorn Canyon National Recreation Area has developed and maintains a persistent and expanding severe problem with noxious weeds. The previous and ongoing disturbance around the historic ranches, wild horse areas, fluctuating lake levels and cattle trailing areas provides seed beds for noxious weeds as well as vectors for the weeds. Areas previously irrigated are losing their pasture grasses leaving bare patches to be colonized by both early successional and aggressive noxious weeds. Extensive weed mapping has shown that the weed areas are primarily associated the historic ranches, old agricultural fields, irrigation ditches, reservoir flood pool, cattle trailing routes and the

wild horse range, all related to cultural landscapes and traditions of arid land use.

The five historic ranches have many of their features such as outbuildings, irrigation ditches, historic fences and cultivated plants still present. The challenge is to maintain these cultural features without having them destroyed by noxious weeds that also have the potential to invade the surrounding natural areas. Cultural Landscapes will be addressed as an impact topic in the environmental assessment.

Soils: According to the National Park Service's *Management Policies 2001*(2000), the National Park Service will strive to understand and preserve the soil resources of the park units and prevent, to the extent possible, unnatural erosion, physical removal or contamination of the soil or its contamination of other resources.

The soils of Bighorn Canyon National Recreation Area reflect the complex geology of the area but most in the areas of weed infestation have developed under arid conditions. Some of these soils are friable and erodable. Potential for wind and water erosion with disturbance is moderate to high. The characteristics of the friable soils may make revegetation very difficult. The proposed actions and alternatives have the potential to impact soils through increased erosion as a result of non-native vegetation removal or through short-term soil contamination by herbicides. Therefore soils will be addressed as an impact topic.

Water Resources (Water Quality, Wetlands and Floodplains): National Park Service policies require protection of water quality consistent with the Clean Water Act. This includes protection of surface waters as well as underground aquifers and wetlands. Executive Order 11990, *Protection of Wetlands* and Executive Order 11998, *Protection of Floodplains* requires federal agencies to avoid, wherever possible, adversely affecting wetlands and floodplains.

Bighorn Canyon National Recreation Area is located mostly in a desert. On the rocky plateaus north of Crooked Creek, ground water has not been accessible except for areas of calcarious springs where the water seeps out of the bottom of limestone cliffs. Most of the water used by settlers in this "Dryhead" area came from small streams off the nearby Pryor Mountains and a few springs and cisterns. The historic ranches and grazing areas are located near the few areas of wetlands and creeks in the park and this is where the majority of noxious weed infestations tend to be located. In these areas, a minimal risk for short-term groundwater and surface water contamination may exist as a result of proposed weed management activities. Potential impacts to wetlands and floodplains will be further addressed as an impact topic.

In the Southern part of the recreation area, the groundwater is closer to the surface, especially in the greasewood flats and the floodplain of the Bighorn River near the ML Ranch. Wells can be drilled in this area though the groundwater is usually alkaline. In times of high agricultural irrigation, water tables may be as high as 40 feet below the surface so potential for water contamination is present in spite of the aridity of the area. Because of the potential of ground and surface water contamination in areas where weeds are found, water quality will

be further considered as an impact topic.

Biotic Communities (Vegetation and Wildlife): The National Environmental Policy Act of 1969 (42 USC 4321 *et seq*.) calls for an examination of the impacts on all the components of the affected ecosystems. National Park Service policy is to maintain all the components and processes of naturally evolving park ecosystems, including the natural abundance, diversity and ecological integrity of plants and animals (National Park Service *Management Policies 2001*.)

Because of the history of disturbance and continuing disturbance, noxious weeds threaten the integrity of several natural communities including unique basin desert grasslands, high quality creek riparian areas and the forage base of the Rocky Mountain bighorn sheep. In natural areas, all efforts at weed control must be approached from the perspective of managing vegetative communities rather than just killing weeds. Collateral damage to plants and animals from weed control methods must be minimized to protect biodiversity and ecosystem health. Potential for damage to biotic communities exists so it will be discussed as an impact topic.

Threatened, Endangered and Candidate Species and Species of Special Concern: The Endangered Species Act (1973) requires an examination of impacts on all federally-listed threatened or endangered species. National Park Service policy also requires examination of the impacts on federal candidate species as well as state listed threatened, endangered, candidate, rare, declining and sensitive species. The only federally threatened or endangered species in Bighorn Canyon National Recreation Area is the bald eagle but the park is home to several endemic plant species concern for the States of Wyoming and Montana as well as some state listed bats and reptiles of concern. Since these species may be found near areas of noxious weeds and/or utilize habitats associated with the proposed weed management actions, threatened, endangered and candidate species and species of special concern will be addressed as an impact topic.

Visitor Use and Experience: In addition to management of noxious weeds, the Division of Resource Management at Bighorn Canyon is responsible for the control of the early successional annuals and some exotic, non-noxious perennials along the roadsides, visitor use areas, marinas, utility yards, campgrounds and lawns around the administration buildings at Ft. Smith. Most of these early successional weeds are exotics such as tumble mustard (Sisymbrium altissimum) and halogeton (Halegeton glomeratus) but some like wild licorice (Glycyrrhiza lepidota) and poison ivy (Toxicodendron rhdbergii) are native. These areas, and the associated native and non-native vegetation, are maintained for aesthetic appearance, safety and visitor comfort.

Components of the proposed actions and alternatives may include activities such as herbicide spraying in or near developed or designated visitor use areas. The presence of weed infestations also results in inappropriate interpretation of the parks natural and cultural resources. Since both the existing presence of weeds and the proposed weed management activities will influence visitor use and experience at Bighorn Canyon National Recreation Area, visitor use and experience will

be addressed as an impact topic.

Recreation Area Operations: Many of the targeted weed areas are located near historic ranch buildings where structural restoration projects are ongoing, or in visitor use areas where there are often ongoing maintenance activities. Weed management actions associated with historic structures may result in limited site closures and/or may temporarily impact the work of maintenance or restoration crews at historic sites. Additionally, some weed infestations (such as tamarisk) currently limit or prohibit visitor access within natural habitats. Weed management actions within such habitats could ultimately expand/improve recreational opportunities for park visitors. Based on the se factors, recreation area operations will be addressed as an impact topic in the environmental assessment.

Impact Topics Dismissed from Further Analysis in This Environmental Assessment

Archeological Resources*:* Native Americans have used The Bighorn Canyon area for almost 10,000 years. The Bad Pass Trail, a route from the Great Plains to the Bighorn Basin parallels the park road through much of the park. The park has multiple archeological sites including rock structures, flaking sites, siege sites, vision quest sites, cairns and teepee rings. Two of these sites are on the National Register of Historic Places: The Pretty Creek Archeological Site and the Bad Pass Trail. These locations were inventoried and mapped when the park was created. The major weed infestations are well away from the archeological sites in areas that were heavily disturbed by ranching, creation of the park road or the fluctuating water of the reservoir. The area of the park road and the reservoir were inventoried for archeological sites before disturbance by road construction and the dam. Except for possible revegetation of heavily infested old field sites, the preferred action would not involve any disturbance of the soil. The proposed action was discussed with Montana and Wyoming SHPO (and copies of this EA sent to them) and the NPS Archeologist. No impact on archeological resources was anticipated because of lack of significant soil disturbance and lack of proximity of the targeted weeds to archeological sites so they are dismissed as an impact topic.

Ethnographic Resources: Ethnographic resources are defined by the National Park Service as any “site, structure, object, landscape or natural resource feature assigned traditional legendary, religious, subsistence or other significance in the cultural system of a group traditionally associated with it” (Director’s Order #28, *Cultural Resource Management Guideline*, 1997). Before European settlement, the Crow used the land where the current day Bighorn Canyon National Recreation Area is located. However when the Crow Reservation was created, only the 540-acre North District was included in the Park. A letter was sent to the Tribal Chairman of the Crow Nation, describing the proposed action (See Appendix C). No response to the letter was received. Previously the Crow Nation had indicated what parts of the proposed Bighorn Canyon National Recreation Area they valued as part of

the Crow National Heritage. In 1971, the Crow Tribal Council passed resolution 71-12 that specifically called for the preservation of the archeological resources of the Grapevine and Dryhead Drainages. Both stream drainages are well away from the area targeted for weed control. Because of lack of proximity to ethnographic resources, they are dismissed as an impact topic.

Historic Structures: Bighorn Canyon National Recreation Area has five historic ranches within its boundaries and four are listed on the National Register of Historic Places: the Mason-Lovell Ranch, Hillsboro, the Lockhart Ranch and the Ewing-Snell Ranch. Also the Bighorn Headgate in the North District of Bighorn Canyon National Recreation Area is on the National Register. The National Historic Preservation Act, as amended in 1992(16 USC 470 *et seq*.); the National Environmental policy Act of 1969 (42 USC 4321 *et seq*.); and the National Park Service's Director's Order #28, *Cultural Resource Management Guideline* (1997) *Management Policies, 2001*(2000) and Director's order #12*, Conservation Planning, Environmental Impact Analysis, and Decision Making*(2001) require the consideration of impacts on historic structures listed in or eligible for listing in the National Register of Historic Places. The proposed action and the alternatives do not involve any disturbance of the historic ranch buildings, the headgate or immediate proximity's to these structures. Historic structures are dismissed as an impact topic but the cultural landscapes associated with these ranches do have some potential for impact and will be analyzed under "Cultural Landscapes".

Museum Collections: The National Park Service's *Management Policies, 2001*(2000) and Director's Order #28*, Cultural Resource Management Guideline* (1997) require the consideration of impacts on museum collections (historic artifacts, natural specimens, and archival and manuscript material. All of the museum collections are housed in the South District Visitor Center of the North District Administration Building. No aspect of the proposed action or alternatives is carried out in or near these buildings so museum collections were dismissed as an impact topic.

Geology and Topography*:* National Park Service *Management Policies 2001* (2000) require the protection of significant geologic and topographic features. Bighorn Canyon National Recreation Area is located at the Northern end of the Big Horn Basin between the Bighorn and Pryor Mountains. The Bighorn River was a meandering stream that was uplifted about 10 million years ago to form a deep canyon. The area is geologically very diverse with exposed strata from the Cambrian through the Cretaceous Periods, heavily faulted, uplifted, folded and eroded. The geologic resources of Bighorn Canyon National Recreation Area are extensive but the proposed integrated weed management program would not involve any significant ground disturbance. Therefore, the proposed weed management actions will not impact these resources.

Prime and Unique Farmlands: In August, 1980, the Council on Environmental Quality (CEQ) directed that federal agencies must assess the effects of their actions on farmland soil classified by the U.S. Department of Agriculture's Natural Resource Conservation Service as prime or unique. Prime or unique farmland is defined as soil that

particularly produces general crops such as common foods, forage, fiber and oil seed; unique farmland produces specialty crops such as fruits, vegetables and nuts. While there are old abandoned farmlands associated with the all five historic ranches, the soil of these ranches is marginal for production even with irrigation. The sources of water for irrigation are additionally limited and unreliable. At best these lands produced a single crop of mixed grass and alfalfa hay and cannot be considered as either prime or unique. The proposed alternatives would result in neither the degradation nor the conversion of existing prime farmland to nonagricultural uses. Therefore, the topic of prime and unique farmlands was dismissed as an impact topic.

Air Quality: Section 118 of the Clean Air Act(42 USC 7401 *et seq*.) requires a park to meet all federal, state and local pollution standards. Bighorn Canyon National Recreation Area is designated as a Class II air quality area under the Clean Air Act as amended. A Class II area designation indicates the maximal allowable increases in concentrations of pollutants over baseline concentrations of sulfur dioxide and particulate matter as specified in Section 163 of the Clean Air Act. Further, the clean Air Act requires that the federal land manager has an affirmative responsibility to protect air quality related values (including visibility, plants, soils, water quality, cultural resources and visitor health) from adverse pollution impacts.

Spraying with herbicides does involve the temporary suspension of chemicals in the atmosphere. The herbicides used are selected for low volatility and fall to the ground in a short time. They are approved for range use so they have very low toxicity to animals. Under the conditions at Bighorn Canyon National Recreation Area, the herbicides are used in very localized areas. Any limited short-term impacts can be minimized/mitigated through use of appropriate safety gear and through proper application of chemicals on targeted areas. There is no affect on visibility, PM10, NOx, ozone, hydrocarbons or SO2. Overall there would be negligible degradation of air quality that would be local and temporary. Bighorn Canyon National Recreation Area’s Class II air quality would not be affected by the proposal or its alternatives. Therefore, air quality was dismissed as an impact topic.

Soundscape Management: In Accordance with National Park Service *Management Policies 2001* and Director’s Order #47, *Sound Preservation and Noise Management*, an important part of the National Park Service mission is preservation of natural soundscapes associated with national park units. Natural soundscapes exist in the absence of human caused sound. The natural ambient soundscape is the aggregate of all the natural sounds that occur in the parks. Natural sounds occur within and beyond the range of sounds that humans can perceive and can be transmitted through air, water or solid materials. The frequencies, magnitudes and durations of human-caused sound considered acceptable varies between National Park Service units, as well as potentially throughout each park unit, being generally greater in developed areas that undeveloped areas.

Bighorn Canyon National Recreation Area is known for its quiet, remote desert setting. On the plateaus above the canyon rims, the soundscape is one of silence, interrupted only by the wind, birds and bighorn sheep.

There is noise from motorboats on Bighorn Lake, but the canyon is so deep that the boats are barely heard if one is on the canyon rim and not heard at all away from the rim. The components of the proposed action and alternatives tend to be very quiet activities. Use of motorized equipment is limited to the park road and developed areas already being used by cars, trucks and recreational vehicles. Any dissonant sounds would be short lived and confined to developed areas so soundscape management was dismissed as an impact topic.

Lightscape Management*:* In accordance with National Park Service *Management Policies 2001*, the National Park Service strives to preserve natural ambient lightscapes, which are natural resources and values that exist in the absence of human caused light. Bighorn Canyon National Recreation Area has sources of human caused light only at two campgrounds and the Visitor Center. Since the proposed action and alternatives involve no use of human caused light, lightscape management is dismissed as an impact topic.

Socioeconomic Environment: The proposed action or the alternatives would neither change local and regional land use nor appreciably impact local businesses or other agencies. Therefore, socioeconomic environment was dismissed as an impact topic.

Environmental Justice: According to the Environmental Protection Agency, environmental justice is the fail treatment and meaningful involvement of all people, regardless of race, color, national origin or income with respect to the development, implementation and enforcement of environmental laws, regulations and policies. Fair treatment means that no group of people, including a racial, ethnic or socioeconomic group, should bear a disproportionate share of negative environmental consequences resulting from industrial, municipal and commercial operations or the execution of federal, state, local and tribal programs and policies.

Presidential Executive Order 12898 *"General Actions to Address Environmental Justice in Minority Populations and Low-Income Populations",* requires all federal agencies to incorporate environmental justice into their missions by identifying and addressing the disproportionate high and/or adverse human health or environmental effects of their programs and policies on minorities and low-income populations and communities. The nearby Bighorn Basin and town of Lovell are economically depressed with many low-income families. There are only scattered minorities. The proposed action and alternatives would not have health or environmental affects on minorities or low-income populations or communities as defined in the Environmental Protection Agency's Draft Environmental Justice Guidance (July 1996). The proposed action will improve the experience of using the park for all populations, regardless of race or income status. Therefore, environmental justice was dismissed as an impact topic

ALTERNATIVES INCLUDING THE PREFERED ALTERNATIVE

INTRODUCTION

This section describes the National Park Services proposed approach (the

preferred alternative) and two alternatives approaches for managing weeds within Bighorn Canyon NRA. The alternatives and the assessment of the potential environmental consequences of each alternative form the core of this Environmental Assessment.

In formulating the alternatives, the planning team considered the park's purposes and significance, the National Park Service mission, and other legal mandates and policies under which the park operates. In addition, the interdisciplinary planning team solicited input from the public, government agencies, tribes, and other organizations about desires future conditions of the park and in identifying specific issues that needed to be addressed related to implementation of a weed management program.

Using all of the above information, the planning team developed three potential alternatives. Each alternative is defined by a "concept", a "desired condition" and by "general management strategies" as related to the parks natural, cultural and recreational resources. For purposes of this document the above terms have been defined as follows:

- **Concept** – the general idea that is behind the alternative.
- **Desired Conditions** – the goals are end results that park managers are striving to achieve. Desired conditions reflect the park's purposes and mission goals, and ensure that the NPS preserves Bighorn Canyon's natural and cultural resources and provides quality visitor experiences.
- **General Management Strategies** – describe the general actions park managers intend to take to achieve the desired conditions. These strategies are not confined to any single management zone, and may apply park wide or to specific geographic areas or facilities.

The park has identified five different management zones based upon the types of weeds that are problematic, the amount and type of disturbance, management goals and the condition of the underlying vegetative communities. They are: 1) developed visitor/administrative facilities- highly disturbed with desired maintenance of lawns, gravel surfaces, concrete etc. 2) historic ranches- previously heavily disturbed with some restoration activities, goal is maintenance and restoration of the cultural landscape 3) recreation facility areas- campgrounds and picnic areas, ongoing disturbance, goal is maintenance of an attractive environment utilizing native vegetation as much as possible 4) roadways/trailing routes-high disturbance and high rate of introduction of new alien plants, goal is safety, good esthetic appearance and prevention of dissemination of noxious weeds 5) natural areas- underlying vegetation is native communities except for the high waterline areas around the reservoir, goal is maintaining as healthy a native plant community as possible with no spread of alien plants from the reservoir area.

The most common "weeds" that may be targeted for control include the state listed noxious weeds- spotted knapweed (Centaurea biebersteinii), diffuse knapweed (Centaurea diffusa), Russian knapweed (Acroptilon repens), tamarisk (Tamarix chinensis), whitetop (Cardaria sp.), leafy spurge (Euphorbia esula), field bindweed (Convolvulus arvensis), Canada thistle (Cirsium canadensis), bull thistle (Cirsium vulgare),

houndstongue (Cynoglossum officinale) and other state listed species if found. It also includes puncture vine (tribulus terrestris), Swainsonpea (Sphaerophysis salsula) and cheatgrass (Bromus tectorum). A complete list of targeted species and thresholds is included in the Integrated Pest Management Program of Bighorn Canyon National Recreation Area.

ALTERNATIVE A: No Action

CONCEPT

Under NPS definitions, the "No Action Alternative is the current and ongoing action. In response to Management Policies 2001(2000) and Executive Order 13112 (1999) the resource management staff of Bighorn Canyon National Recreation Area developed an Integrated Pest Management Program. However full implementation of this program has been limited by the lack of a designated Integrated Pest Manager and staff resources. Many of the components of the Integrated Weed Management Program have been adopted such as prevention, early detection, some education, mechanical controls, bio-controls, chemical controls and revegetation. However the strategies change from year to year because of high staff turnover and lack of over all coordination.

DESIRED FUTURE CONDITION

Park natural, cultural, and recreational resources are enhanced through the implementation of an integrated weed management program. Weed management actions are proactive and guided by the intent of restoring and maintaining healthy natural and cultural landscapes.

GENERAL MANAGEMENT STRATEGIES

Components of the current action are described in the parts of the Integrated Pest Management Program of Bighorn Canyon National Recreation Area that pertains to vegetative management. The action includes all components related to prevention and control of noxious and undesirable weeds. For details, refer to the Integrated Pest Management Program.

MANAGEMENT ZONE PRESCRIPTIONS

MANAGEMENT ZONE	LOCATION(S)	PROPOSED ACTIONS
Developed Visitor/Administrative Facilities Weeds-mostly early successional weeds like mustards, puncturevine, annual chenopodia , bindweed	Yellowtail Dam Visitor Center Maintenance yard BOR Maintenance yard Yellowtail Dam Recreational fields at Ft. Smith Park Headquarters building at Ft. Smith Sewage Lagoon areas	Mechanical treatments (limited mowing, hand pulling) Appropriate herbicide application Limited visitor education Little prevention of spread of weeds by staff activities

Historic Ranches Weeds-early successional weeds, Canada thistle, whitetop, cheatgrass	Mason-Lovell Ranch Lockhart Ranch Hillsboro Ranch Ewing-Snell Ranch	Limited mechanical treatments (mowing, hand pulling); Appropriate herbicides, Biocontrol agents Early revegetation of some disturbances
Roadways/Trailing Routes Weeds- knapweeds, cheatgrass, sweetclover, halogeton, Bindweed houndstongue,Russian thistle, other early successional weeds.	Highway 37 (southern unit of park) Highway 313 (northern unit of park) Lockhart Lane (Trailing routes follow Highway 37 and Lockhart Lane) Road to Ok-A-Beh Sidewalks and paved roads in Ft. Smith Gravel roads around Ft. Smith	Mechanical treatments (mowing) Appropriate herbicides Ranger division currently too fragmented to enforce existing rules on weed free hay, moving cattle together
Recreation Facility Areas Early successional weeds, halogeton, Russian thistle, knapweeds in north district, Canada thistle	Three Mile Access Barry's Landing Black Canyon CG Horseshoe Bend Medicine Creek Boat CG Afterbay CG and Access	Mechanical treatments (mowing, hand pulling); Appropriate herbicides, Limited education, Preventation
Natural Areas Weeds-cheatgrass, halogeton, Russian thistle, houndstongue, Canada thistle, Russian knapweed, tamarisk	All other land areas not immediately associated with the above management zones Pryor Mountain Wild Horse Range, old fire areas, old cattle hangout areas from previous grazing	Herbicide application, Early reseeding of recent fires Cut and spray of tamarisk

The basic components of the integrated weed management program currently in use include:

- Prevention and early detection of weed colonization
  - Limited education of public and staff on limiting seed vectors done by the interpretive division
  - Limitation of disturbance and early revegetation of disturbances in about half of construction and restoration activities in the South District
  - Requirement of use of weed free hay and gravel is on the books but is not enforced at this time

- Limited education of staff and the public on weed identification and prevention

- Ongoing survey, detection and mapping of noxious weed infestations

- Prioritization of weed infestations depending upon the potential of the plant to cause damage and the likelihood for control or eradication. Priority of treatment:

  - Early detection and eradication of new infestations
  - Containment of larger scale infestations is limited to some of the more visible ones
  - Control of noxious weed infestations on sites that have a good understory of grass and good potential productivity is done intermittently as staff, treatment windows and equipment availability allows
  - Little control of large-scale infestations. Control in areas of heavy infestation usually requires multiple methods including bio-controls, cultural controls chemical controls, and revegetation with competitive plantings, prescribed fire and/or mechanical controls. Such controls need to be used in a manner based upon the biology of the target species and the biotic, soil and climate conditions of the infested area.

  This section describes how resource management prioritizes management of the identified noxious weeds. However the current priorities for weed control are in the right of way and visitor use area, based upon visibility and impact on visitor enjoyment.

- Select methods and herbicides based upon appraisal of risk to ground and surface water (RAVE score-See Appendix D), native plant communities, native animals and visitors and staff. This is currently standard operating procedure in development of the Pesticide Use Proposals and recalculated with any spraying near water resources.

- Ongoing monitoring and recording of the results of all treatments and management strategies with change in strategies as indicated by the results of monitoring. Follow-up visits are part of the weed database.

- Coordination of weed control efforts with adjacent and regional agencies and landowners through involvement with Wyoming Weed and Pest and the Yellowtail CRM

- The emphasis of weed management is management of vegetative communities rather than simply killing of weeds as much as limited resources allow.

IMPLEMETATION

The National Park Service has implemented the above activities and

management actions in response to previous mandates and the overwhelming weed problem as much as it can with the resources available. This implementation has been a gradual evolution as best management strategies for weed control are improved. The highest priority would be given to implement actions that serve the following functions:

- address critical resource protection needs
- address visitor and employee safety concerns
- provide the park visitor with the greatest quality experience

MITIGATION MEASURES

To minimize impacts of the current weed management program, only herbicides approved for range use that have low toxicity to animals and humans are used. Timing of spraying is at times when the plant is most sensitive to reduce the amount of herbicide needed and at times when public access is unlikely.

Multiple weed control methods are used in a manner that gives the greatest control of the targeted weeds at the least environmental risk. In each weed control effort, the question is asked “what poses a greater risk to human and environmental safety-the weed or the treatment?”

When a herbicide is selected for a site, the RAVE score is determined and if it over 64, a different herbicide or method will be selected. This RAVE Score is part of the information submitted with the yearly Pesticide Use Proposals

If during revegetation projects related to weed control, previously unknown archeological resources are discovered, all work in the immediate vicinity of the discovery would be halted until the resources could be identified and documented and an appropriate mitigation strategy developed, if necessary, in consultation with the Montana or Wyoming State Historic Preservation Office. In the unlikely event that human remains, funerary objects, sacred objects, or objects of cultural patrimony are discovered during weed treatment, provisions outlined in the Native American Graves Protection and Repatriation Act (25 USC 3001) of 1990 would be followed.

ALTERNATIVE B: Preferred Action

CONCEPT

Expand existing activities and implement fully integrated weed management program as outlined in the Bighorn Canyon National Recreation Area Integrated Pest Management Program. The integrated program would include implementation of weed control strategies, prevention, early detection, education, cultural controls, mechanical controls, bio-controls, chemical controls and revegetation.

DESIRED FUTURE CONDITION

Park natural, cultural, and recreational resources are enhanced through the implementation of an integrated weed management program. Weed

management actions are proactive and guided by the intent of restoring and maintaining healthy natural and cultural landscapes.

GENERAL MANAGEMENT STRATEGIES

The proposed action is described in the parts of the Integrated Pest Management Program of Bighorn Canyon National Recreation Area (adopted December 2003) that pertains to vegetative management. The action includes all components of the guidelines related to prevention and control of noxious and undesirable weeds. For details, refer to the Integrated Pest Management Program.

MANAGEMENT ZONE PRESCRIPTIONS

MANAGEMENT ZONE	LOCATION(S)	PROPOSED ACTIONS
Developed Visitor/Administrative Facilities Weeds-mostly early successional weeds like mustards, puncturevine, annual chenopodia , bindweed	Yellowtail Dam Visitor Center Maintenance yard BOR Maintenance yard Yellowtail Dam Recreational fields at Ft. Smith Park Headquarters building at Ft. Smith Sewage Lagoon areas	Mechanical treatments (mowing, hand pulling) Appropriate herbicide application Visitor education Prevention of Spread of weeds by staff activities
Historic Ranches Weeds-early successional weeds, Canada thistle, whitetop, cheatgrass	Mason-Lovell Ranch Lockhart Ranch Hillsboro Ranch Ewing-Snell Ranch	Mechanical treatments (mowing, hand pulling) Appropriate herbicides Biocontrol agents Early revegetation of disturbances Education, prevention
Roadways/Trailing Routes Weeds- knapweeds, cheatgrass, sweetclover, halogeton, bindweed houndstongue, Russian thistle, other early successional weeds.	Highway 37 (southern unit of park) Highway 313 (northern unit of park) Trailing routes follow Highway 37 and Lockhart Lane Road to Ok-A-Beh Sidewalks and paved roads in Ft. Smith Gravel roads around Ft. Smith	Mechanical treatments (mowing, hand pulling); Appropriate herbicides Work with ranger division to enforce existing rules on weed free hay, moving cattle together Possible biocontrol agents for knapweed on Road to Ok-A-Beh Education to control vectors of weed seeds
Recreation Facility Areas Early successional weeds, halogeton, Russian thistle, knapweeds in north district, Canada thistle	Three Mile Access Barry's Landing Black Canyon CG Horseshoe Bend Medicine Creek Boat CG Afterbay CG and Access	Mechanical treatments (mowing, hand pulling); Appropriate herbicides, Education, Early revegetation of disturbance Preventation
Natural Areas Weeds-cheatgrass, halogeton, Russian thistle, houndstongue, Canada thistle Russian knapweed, Tamarisk	All other land areas not immediately associated with the above management zones Pryor Mountain Wild Horse Range, old fire areas, old cattle hangout areas from previous grazing	Herbicide application Early reseeding of recent fires Work with BLM to have a suitable stocking rate on the wild horse range Cut and spray of tamarisk

Cultural and Natural Resource Management Strategies:

The basic components of the proposed integrated weed management program include:

- Prevention of weed colonization
  - Education of staff on limiting seed vectors
  - Limitation of disturbance and early revegetation of disturbance
  - Regulatory pest management such as requirement of weed free hay and gravel
  - Identification and implementation of "Best Management Practices"

- Education of staff on weed identification and prevention

- Ongoing survey, detection and mapping of noxious weed infestations

  - plantings, prescribed fire and mechanical controls. Such controls need to be used in a manner based upon the biology of the target species and the biotic, soil and climate conditions of the infested area

  - Control of large-scale infestations is always to proceed from the outside moving in toward the center of the infestation.

- Select methods and herbicides based upon appraisal of risk to ground and surface water (RAVE score-See Appendix D), native plant communities, native animals and visitors and staff.

- Prioritize weed infestations depending upon the potential of the plant to cause damage and the likelihood for control or eradication. Priority of treatment:

  - Early detection and eradication of new infestations
  - Containment of larger scale infestations
  - Control of noxious weed infestations on sites that have a good understory of grass and good potential productivity
  - Control of large-scale infestations immediately adjacent to areas initially being treated to minimize reintroduction of weeds. Control in areas of heavy infestation will usually require multiple methods including bio-controls, cultural controls chemical controls, revegetation with competitive plantings, prescribed fire and mechanical controls. Such controls need to be used in a manner based upon the biology of the target species and the biotic, soil and climate conditions of the infested area
  - Control of large-scale infestations is always to proceed from the outside,

moving in toward the center of the infestation.

This section describes how resource management prioritizes management of the identified noxious weeds.

- Select methods and herbicides based upon appraisal of risk to ground and surface water (RAVE score-See Appendix D), native plant communities, native animals and visitors and staff.

- Ongoing monitoring and recording of the results of all treatments and management strategies with change in strategies as indicated by the results of monitoring

- Coordination of weed control efforts with adjacent and regional agencies and landowners

- The emphasis of weed management is to be management of vegetative communities rather than simply killing of weeds.

Visitor Use Strategies:

- Develop education programs to help park visitors become aware of weed issues and how they can help.
- Educate park visitors to "Best Management Practices" necessary to reduce the introduction or spread of invasive weeds.
- Use popular or highly visible visitor use areas (e.g. historic sites, popular recreation locations) as a forum for educating the public about the impacts of weed and benefits of weed management.
- Manage weed infestations to ensure the park visitor has an appropriate interpretation of the parks natural and cultural landscapes.

IMPLEMETATION

The National Park Service would implement the activities and management actions proposed under this alternative when funding and adequately trained staff, including an Integrated Pest Manager, are available to implement a coordinated program. The Park Service would expand partnerships with other agencies or groups to implement several of the actions described in this alternative. Given adequate funding, the highest priority would be given to implement actions that serve the following functions:

- address critical resource protection needs
- address visitor and employee safety concerns
- provide the park visitor with the greatest quality experience

MITIGATION MEASURES

To minimize impacts of an integrated weed management program, only herbicides approved for range use that have low toxicity to animals and humans will be used. Timing of spraying will be at times when the plant is most sensitive to reduce the amount of herbicide needed and at times when public access is unlikely.

Multiple weed control methods will be used in a manner that gives the greatest control of the targeted weeds at the least environmental risk. In each weed control effort, the question will be asked “what poses a greater risk to human and environmental safety-the weed or the treatment?”

When a herbicide is selected for a site, the RAVE score will be determined and if it over 64, a different herbicide or method will be selected.

If during revegetation projects related to weed control, previously unknown archeological resources are discovered, all work in the immediate vicinity of the discovery would be halted until the resources could be identified and documented and an appropriate mitigation strategy developed, if necessary, in consultation with the Montana or Wyoming State Historic Preservation Office. In the unlikely event that human remains, funerary objects, sacred objects, or objects of cultural patrimony are discovered during weed treatment, provisions outlined in the Native American Graves Protection and Repatriation Act (25 USC 3001) of 1990 would be followed.

ALTERNATIVE C: Control targeted exotic plants with non-chemical means only.

CONCEPT

Manage native vegetation communities with a combination of hand pulling of weeds, mowing, bio-control agents, cultural controls and revegetation. Emphasize prevention and early detection of new weed infestations. Proceed with education programs for the park staff and public to minimize disturbance and the spread of weeds. This alternative would include all the components of Alternative B except the use of herbicides.

DESIRED FUTURE CONDITION

Park natural, cultural, and recreational resources are enhanced through the implementation of an integrated weed management program. Weed management actions are proactive and guided by the intent of restoring and maintaining healthy natural and cultural landscapes.

GENERAL MANAGEMENT STRATEGIES

The proposed action is described in the parts of the Integrated Pest Management Program for Bighorn Canyon National Recreation Area that pertains to vegetative management. The action includes all components of the guidelines related to prevention and control of noxious and undesirable weeds with the exception of the use of herbicides. For details, refer to the Integrated Pest Management Program.

MANAGEMENT ZONE PRESCRIPTIONS-ALTERNATIVE C

MANAGEMENT ZONE	LOCATION(S)	PROPOSED ACTIONS
Developed Visitor/Administrative Facilities Weeds-mostly early successional weeds like mustards, puncturevine, annual chenopodia , bindweed	Yellowtail Dam Visitor Center Maintenance yard BOR Maintenance yard Yellowtail Dam Recreational fields at Ft. Smith Park Headquarters building at Ft. Smith Sewage Lagoon areas	Mechanical treatments (mowing, hand pulling Visitor and staff education Prevention of spread of weeds by staff activities
Historic Ranches Weeds-early successional weeds, Canada thistle, whitetop, cheatgrass	Mason-Lovell Ranch Lockhart Ranch Hillsboro Ranch Ewing-Snell Ranch	Mechanical treatments (mowing, hand pulling); Bio-control agents, Early revegetation of Disturbances Education, prevention
Roadways/Trailing Routes Weeds- knapweeds, cheatgrass, sweetclover, halogeton, Bindweed houndstongue ,Russian thistle, other early successional weeds.	Highway 37 (southern unit of park) Highway 313 (northern unit of park) Lockhart Lane (Trailing routes follow Highway 37 and Lockhart Lane) Road to Ok-A-Beh Sidewalks and paved roads in Ft. Smith Gravel roads around Ft. Smith	Mechanical treatments (mowing, hand pulling); Work with ranger division to enforce existing rules on weed free hay, moving cattle together Possible bio-control agents for knapweed on Road to Ok-A-Beh Control of weed vectors
Recreation Facility Areas Early successional weeds, halogeton, Russian thistle, knapweeds in north district, Canada thistle	Three Mile Access Barry's Landing Black Canyon CG Horseshoe Bend Medicine Creek Boat CG Afterbay CG and Access	Mechanical treatments (mowing, hand pulling); Education Early revegetation of disturbance Prevention
Natural Areas Weeds-cheatgrass, halogeton, Russian thistle, houndstongue, Canada thistle, Russian knapweed, tamarisk	All other land areas not immediately associated with the above management zones Pryor Mountain Wild Horse Range, old fire areas, old cattle hangout areas from previous grazing	Early reseeding of recent fires, Work with BLM to help maintain an appropriate stocking rate on the wild horse range Pulling program for tamarisk seedlings

Cultural and Natural Resource Management Strategies:

The basic components of the proposed integrated weed management program include:

- Prevention and early detection of weed colonization
    - Education of staff on limiting seed vectors
    - Limitation of disturbance and early revegetation of disturbance-
    - Identification and implementation of "Best Management Practices" (e.g. requirement of use of weed free hay and gravel.
- Education of staff on weed identification and prevention
- Ongoing survey, detection and mapping of noxious weed infestations
- Prioritize weed infestations depending upon the potential of the plant to cause damage and the likelihood for control with non-chemical means only. Priority would be:
    - Early detection and eradication of new infestations that are susceptible to non-chemical means
    - Containment of larger scale infestations of weeds susceptible to non-chemical means
    - Control of susceptible weed infestations on sites that have a good understory of grass and good potential productivity
    - Control of large-scale infestations is unlikely to be effective for most species of noxious weeds without the use of chemicals unless there are effective bio-control agents appropriate to the biology of the target species and the biotic, soil and climate conditions of the infested area
- Ongoing monitoring and recording of the results of all treatments and management strategies with change in strategies as indicated by the results of monitoring
- Coordination of weed control efforts with adjacent and regional agencies and landowners
- The emphasis of weed management is to be management of vegetative communities rather than simply killing of weeds

Visitor Use Strategies:

- Develop education programs to help park visitors become aware of weed issues and how they can help.
- Educate park visitors to "Best Management Practices" necessary to reduce the introduction or spread of invasive weeds.
- Use popular or highly visible visitor use areas (e.g. historic sites, popular recreation locations) as a forum for educating the public about the impacts of weed and benefits of weed management.
- Manage weed infestations to ensure the park visitor has an appropriate interpretation of the parks natural and cultural landscapes.

IMPLEMETATION

The National Park Service would implement the activities and management actions proposed under this alternative over the next 10 years as funding becomes available. The Park Service would expand established partnerships with other agencies or groups to implement several of the actions described in this alternative. Given adequate funding, the highest priority would be given to implement actions that serve the following functions:

- address critical resource protection needs
- address visitor and employee safety concerns
- provide the park visitor with the greatest quality experience

MITIGATION MEASURES

Multiple non-herbicide weed control methods will be used in a manner that gives the greatest control of the targeted weeds at the least environmental risk. In each weed control effort, the question will be asked "what poses a greater risk to human and environmental safety-the weed or the treatment?"

If during revegetation projects related to weed control, previously unknown archeological resources are discovered, all work in the immediate vicinity of the discovery would be halted until the resources could be identified and documented and an appropriate mitigation strategy developed, if necessary, in consultation with the Montana or Wyoming State Historic Preservation Office. In the unlikely event that human remains, funerary objects, sacred objects, or objects of cultural patrimony are discovered during weed treatment, provisions outlined in the Native American Graves Protection and Repatriation Act (25 USC 3001) of 1990 would be followed.

ALTERNATIVES Considered but Rejected:

ALTERNATIVE D- **Cessation of action** except for the limited actions described in D.O.12. Active weed control would be limited to removal of individual members of exotic plant populations that pose an imminent danger to visitors or an immediate threat to park resources. Emphasize prevention of new weed infestations. Proceed with education programs for the park staff and public to minimize disturbance and the spread of weeds.

Areas of significant weed infestations have already been identified and mapped. The changes in distribution would continue to be monitored to identify possible vectors and enhance prevention of new infestations and spread. There would be no use of bio-control agents, herbicides or widespread mechanical controls like mowing. Revegetation with non-controversial native plants would be used only after small recent disturbances related to park activities.

This alternative is at variance with several previous mandates from the National Park Service including *Management Policies 2001*(2000) and Executive Order 13112 (1999) which asks all federal agencies to address the significant economic and biological threats posed by non native species. Also the management and control of invasive non-native species

has been identified as a high priority issue within the National Park Service (NPS) and is specifically, under the Government Performance and Results Act of 1993, identified as an accountable goal for all national park units including Bighorn Canyon National Recreation Area. Because of the history of previous and ongoing disturbance and the biologic nature of the noxious weeds in the park, limitation of weed control activities to removal of individual members of exotic plant populations would have no effect on the weed populations and would allow further spread into natural areas and cultural landscapes.

The noxious weeds being targeted are either rhizomatous species like whitetop that cannot be controlled by mechanical means or are present in such large populations, that limited removal has no effect. Uncontrolled spread of noxious weeds presents a significant danger to native plant and animal communities, especially is disturbance is present. Failure to control weeds in visitor use areas and roadways may present a safety problem as well as decrease the quality of visitor experience.

This alternative is rejected because it does not meet any of the park's objectives for weed management which are: 1) develop and maintain an inventory of known and new noxious weed infestations 2) prevent noxious weed dissemination 3) control or contain weed infestations using multiple modalities that reduce the use of herbicides 4) do as little collateral damage as possible to surrounding native fauna and flora and 5) manage infested native plant communities in a manner that enhances the health of these communities.

ALTERNATIVE E-Control targeted exotic plants with chemical means only.

Extensive use of herbicides to control weed infestations is widely accepted in agricultural and right of way control. It appears to be an appropriate management strategy if the goal is to just kill weeds. However this approach is ultimately ineffective since without healthy desirable plants to out compete the weeds, the weed species will only return after chemical treatment. Often the plants that replace the weeds that were sprayed are even more resistant to treatment and more destructive to the desirable plants. For example, early successional alien species like kochia may be replaced by noxious alien species like spotted knapweed if the soil is left bare after spraying. With repeated chemical treatment, resistance to the chemical may become a problem.

The use of herbicides has an inherent risk to the environment, even when always applied correctly. In native plant communities, the desirable plants are usually more sensitive to the herbicide than the targeted weed species so collateral damage from herbicides is unavoidable. The risk can be reduced to the minimum only by adding other weed control modalities such as prevention of introduction and spread, mechanical controls, bio-control agents and effective vegetative management including revegetation. The multi-modality approach reduces the amount of herbicide used as well as gives the desirable plants a competitive edge. In a native plant community subject to disturbance, repeated use of herbicides alone will result in an increase in weeds and a decrease in the density and diversity of the native plants.

This alternative is rejected because it does not meet any of the park's objectives for weed management which are: 1) develop and maintain an inventory of known and new noxious weed infestations 2) prevent noxious weed dissemination 3) control or contain weed infestations using multiple modalities that reduce the use of herbicides 4) do as little collateral damage as possible to surrounding native fauna and flora and 5) manage infested native plant communities in a manner that enhances the health of these communities.

ENVIRONMENTALLY PREFERRED ALTERNATIVE

The environmentally preferred alternative is determined by applying the criteria suggested in the National Environmental Policy Act of 1969 (NEPA), which is guided by the Council on Environmental Quality (CEQ). The CEQ provides direction that "the environmentally preferable alternative is the alternative that will promote the national environmental policy as expressed in NEPA's Section 101 :"

- fulfill the responsibilities of each generation as trustee of the environment for succeeding generations;
- assure for all generations safe, healthful, productive, and esthetically and culturally pleasing surroundings;
- attain the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequences;
- preserve important historic, cultural and natural aspects of our national heritage and maintain, wherever possible, an environment that supports diversity and variety of individual choice;
- achieve a balance between population and resource use that will permit high standards of living and a wide sharing of life's amenities; and
- enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.

Alternative B, the preferred alternative, is the environmentally preferred alternative. Implementing the integrated weed management program will give the maximum protection of the natural and cultural resources of Bighorn Canyon National Recreation Area with the least possible risk to human and environmental health and safety. Integrated control of noxious weeds will integrate resource protection with opportunities for an appropriate range of visitor uses, which preserves important historic, cultural and natural aspects of our national heritage.

Alternative A, no action (aka current action), is not the environmentally preferred alternative because the current weed management program would not give the maximum protection of the natural and cultural resources of Bighorn Canyon National Recreation Area with the least possible risk to human and environmental health and safety.

Alternative C, control by non-chemical means only, is not the preferred alternative because for some species of noxious weeds like Tamarisk, whitetop and Russian knapweed, non-chemical means alone are ineffective.

These weed species have the potential to degrade natural and cultural resources and limit the range and quality of potential visitor use.

Table 1: Methods Each Alternative Uses to Ensure Each Objective Is Met

Objective	Alternative 1: No Action	Alternative 2: Integrated Weed Management Program	Alternative 3: Weed Management With Non-Chemical Means
1) Develop and maintain an inventory of known and new noxious weed infestations	Yes (+) An inventory of noxious weeds would be maintained to help prevent spread and identify early infestations.	Yes (+) An inventory of noxious weeds would be maintained with a regular search for new infestations.	Yes (+) An inventory of noxious weeds would be maintained with a regular search for new infestations.
2) Prevent noxious weed dissemination	Yes (+) There would be limited means to control the spread of weeds, especially in control of disturbance. Education would be limited.	Yes (+) Multiple means to control the spread of weeds would be used including education, control of disturbance and legislative controls.	Yes (+) Multiple means to control the spread of weeds would be used including education, control of disturbance and legislative controls.
3) Control or contain weed infestations using multiple modalities that minimize the risk of herbicides	Yes (+) Current weed control uses multiple modalities that minimize the risk of herbicides.	Yes (+) Weed control would be done with multiple methods all geared to reducing the amount of herbicide used while maintaining effectiveness.	No (-) While some weeds would be controlled without herbicides, others would not be controlled at all.

Objective	Alternative 1: No Action	Alternative 2: Integrated Weed Management Program	Alternative 3: Weed Management With Non-Chemical Means
4) Do as little collateral damage as possible to surrounding native fauna and flora	Yes (+) The current biology based approach minimizes damage but effectiveness could be improved with better coordination.	Yes(+) The integrated Approach would Minimize damage from herbicides while effectively controlling weeds.	Yes(+) There would be no damage from Herbicides and the other control methods have little potential for damage.
5) Manage infested native plant communities in a manner that enhances the health of these communities.	Yes (+) The current somewhat integrated multiple modality approach does control weeds while enhancing the health of native plant communities.	Yes (+) The integrated multiple modality approach is developed for weed control by enhancing the health of native plant communities.	No (-) This approach may enhance some communities, but it endangers other is areas infested by weeds that cannot be controlled without herbicides.

Table 2: Comparison of Alternatives

Actions	Alternative A: No Action	Alternative B: Integrated Weed Management Program	Alternative C: control of weeds by non-Chemical Means Only
Location and mapping of weed infestation	There is ongoing survey and mapping of new weed infestations	There would be ongoing survey and mapping of new weed infestations.	There would be ongoing survey and mapping of new weed infestations.
Use of preventative measures to slow or prevent noxious spread	Multiple preventative measures are be used to slow or prevent the spread of noxious weeds.	Multiple preventative measures would be used to slow or prevent the spread of noxious weeds.	Multiple preventative measures would be used to slow or prevent the spread of noxious weeds.
Use of herbicides to control noxious and undesirable weeds	Herbicides are used in conjunction with other weed control modalities.	Herbicides would be used in conjunction with other weed control modalities.	No herbicides would be used.

Use of non-chemical means to control noxious and undesirable weeds	Multiple non-chemical means of weed control are used including mechanical, cultural, preventative and biological controls.	Multiple non-chemical means of weed control would be used including mechanical, cultural, preventative and biological controls.	Multiple non-chemical means of weed control would be used including mechanical, cultural, preventative and biological controls.
Restoration of natural areas impacted by weeds to as pristine a status as possible.	Restoration is an integral part of the weed management program but timing is often late.	Restoration would be an integral part of the weed management program.	Restoration would be an integral part of the weed management program.
Ongoing monitoring and follow-up to asses the results of weed management	Monitoring of the results of treatment is built into the weed program database.	Monitoring of the results of treatment and the health of the biotic communities would build into the weed program.	Monitoring of the results of treatment and the health of the biotic communities would build into the weed program.

Table 3: Summary Comparison of Impacts

Impact Topic	Alternative A: No Action	Alternative B: Integrated Weed Management Program	Alternative C: control of weeds by non-Chemical Means Only
Soils	There would be minor, short-term contamination of surface soils from herbicides.	There would be minor, short-term contamination of surface soils from herbicides.	There would be negligible impacts to soils from non-chemical weed management activities but with weeds not controlled by n on-chemical means, the effects to soils would be moderate and long-term.

Cultural Landscapes	There would be minor, short-term risk to cultural landscapes from localized damage from noxious weed treatments. The long-term effects would be beneficial.	There would be minor, short-term risk to cultural landscapes from localized damage from noxious weed treatments. The long-term effects would be beneficial.	There would be negligible short-term effects from non-chemical weed control activities but there would be moderate long-term effects in those cultural landscapes infested with noxious weeds not controlled without herbicides.
Water Resources	There could be minor, short-term effects on water quality from herbicide use. There could be minor effects on floodplain vegetation.	There could be minor, short-term effects on water quality from herbicide use. There could be minor effects on floodplain vegetation.	There would be minor adverse effects on water quality, wetlands and floodplains. There would be moderate effects on floodplain vegetation.
Biotic Communities	There would be a minor short-term effect on biotic communities from weed management activities	There would be a minor short-term effect on biotic communities from weed management activities.	There would be a minor effect on biotic communities from weed management activities except in those areas infested with weeds that do not respond to non-chemical methods. In these areas the adverse effect would be moderate
Threatened, Endangered and Candidate Species and Species of Special Concern	There would be negligible effect on plant species of special concern.	There would be negligible effect on plant species of special concern.	There would be negligible effect on plant species of special concern except in an area adjacent to weeds not controllable without herbicides.

Visitor Use and Experience	There would be minor, short-term effects from weed control activities.	There would be minor, short-term effects from weed control activities.	There would be minor, short-term effects from weed control activities. The results of ineffective vegetative management would have moderate long-term effects.
Recreation Area operations	There would be minor short-term effects on recreation area operations.	There would be minor short-term effects on recreation area operations.	There would be moderate effect on recreation area operations.

AFFECTED ENVIRONMENT

Bighorn Canyon National Recreation Area is a 68,276-acre unit located in south central Montana and north central Wyoming. The counties are Bighorn County in Wyoming and Carbon and Bighorn Counties in Montana. Its centerpiece is the 12,700-acre Bighorn Lake formed behind the Yellowtail Dam at Ft. Smith. The dam is used for flood control, irrigation and hydroelectric power. Because of these uses, the lake is subject to extremes of low water and flooding which impacts the vegetation adjacent to the lake. The Recreation Area is an elongated park with extremes in elevation from 3,600 to 8,000 ft. above sea level. Precipitation varies from an average of 6 inches a year at the southern end to 14 inches near Ft. Smith. Temperatures are equally extreme with highs of 107 degrees and lows down to -30 degrees. Many parts of the park experience high winds, especially on the windswept plateaus above the canyon rim. These extremes make many aspects of weed control technically difficult, especially timing of treatment and revegetation. The park is located at the junction between three major ecosystems: the Great Basin Desert, the Rocky Mountains and the Great Plains. This tremendous range of extremes gives the park a very diverse flora and fauna.

Soils

The soils of Bighorn Canyon National Recreation Area are diverse, reflecting the complex geology of the area. In the areas where the noxious weeds have been mapped the dominant rock substrates are Cretaceous shales, Triassic siltstones and carboniferous limestones. These parent rocks, weathering in an arid climate, produces soils that are fine, alkaline, high in montmorillinite clays and with a high bulk density. These soils absorb water very slowly and very soon reach a point where the moisture is lost to evaporation faster than it can percolate down toward the water table. Because of the aridity, the desert soils are low in organic matter. The deeper grassland soils in the North District tend to be more permeable and higher in organic matter.

Cultural Landscapes

Humans have used the land for almost 10,000 years. The current park road parallels and in places crosses the prehistoric Bad Pass Trail. The first ranchers arrived in the 1880's. The land was used for ranching, farming, dude ranching and mining until creation of the park in 1966. Four of these ranches, the Mason-Lovell Ranch, Ewing-Snell Ranch, Lockhart Ranch and Hillsboro are all on the National Register of Historic Places. All have associated cultural landscapes, which are not listed on the National Register. The cultural landscapes around the Ewing-Snell Ranch, Hillsboro and the Lockhart Ranch are being considered as a historic district. The Mason-Lovell Ranch cultural landscape is too degraded by drought and disturbance for consideration for listing as a cultural landscape.

Water Resources

Most of Bighorn Canyon National Recreation Area is located on an arid rocky plateau. Here the water tables are very deep. Water for wildlife and humans comes from a few small springs coming out of the bottom of rocky hills and from small streams flowing from the Pryor Mountains to the Bighorn River. In the National Recreation Area the Bighorn River is entrenched in Bighorn Canyon from Sykes Mountain to the Yellowtail Dam. The water tables are so deep and inconsistent on the rocky plateaus, that wells were never developed as sources of water by the pioneers who settled here. Along the floodplain of the Bighorn River south of Sykes Mountain, the water tables are higher. If agricultural fields in this area are irrigated from the Shoshone river, water tables may rise high enough to flood basements but after the irrigation waters are cut off in the fall, may drop as low as over 100 feet below the surface.

The Bighorn Reservoir is downstream from an area of significant agricultural development and ten small towns along the Bighorn and Shoshone Rivers. Both rivers are used intensively for irrigation so carry a high load of agricultural chemicals. The Bighorn Basin has very fine, erodible soils with a sparse vegetative cover so the rivers carry a lot of silt. There are extensive uncontrolled infestations of tamarisk and Russian knapweed upstream. The water level of the reservoir is controlled by the Bureau of Reclamation and managed for flood control, collection of irrigation water and generation of electricity and management of a downstream fishery. The result of this management is tremendous fluctuations in the water level from year to year. The high water events carry a tremendous load of silt and weed seeds and spread them out along the high water mark. The result is a weedy “bathtub ring” between the extreme high water marks and the Bighorn River at non-flood stage level.

Biotic Communities

The vegetation of the affected area includes short grass prairie, basin grasslands, Juniperus osteosperma woodlands and old fields in what was once desert shrub, or riparian flood plain. The weeds tend to be localized to areas of previous disturbance from farming, fire, cattle grazing, visitor use areas and right of ways. The native vegetation in

these areas shows varying degrees of degradation. The previously farmed areas show evidence of previous planting of pasture grasses like smooth brome and crested wheatgrass. These planted grasses are not showing evidence of spreading to areas of native vegetation and they are considered part of the cultural landscape rather a weed problem.

These disturbed areas are utilized by a variety of mammals including Rocky Mountain bighorn sheep, Pryor Mountain wild horses, rabbits and assorted rodents. The weedy areas around the historic ranches are rich in reptiles, amphibians and songbirds. Eagles and other raptors are found in the trees and canyon walls around four of the historic ranches as well as around other developed areas. Like people, wildlife takes advantage of the increased water and vegetation.

Threatened and Endangered Species and Species of Special Concern

Potential Federal and State listed Threatened and Endangered Species in the Bighorn Canyon area include: bald eagle, Canada lynx, and black footed ferret. Of these, only the bald eagle is found in Bighorn Canyon National Recreation area as well as the recently de-listed peregrine falcon. The habitat is unsuitable for the other listed species and they have not been seen in Bighorn Canyon National Recreation Area. Potential animals on the species of special concern and candidate species list include leopard frog, milk snake, sturgeon chub, mountain plover, sharptail grouse, northern goshawk, black-tailed prairie dog, Townsend's big-eared bat, swift fox, Merriman's shrew, long–eared myotis, hoary bat and spotted bat (see Appendix F). While there are no known plants on the T&E list in Bighorn Canyon NRA, there are six plant species of concern in the states of Montana and Wyoming that are located near possible or known areas of weed infestation. They include: Sullivantia hapmanii, Rorippa calycina, Erigeron allocotus, Stanleya tomentosa, Astragalus oreganus and Eriogonum brevicaule var.canum.

Visitor Use and Experience

Bighorn Canyon National Recreation Area maintains multiple visitor use sites including five campgrounds, two marina areas, six lake or river accesses, two picnic grounds, 42 miles of road and four historic ranches on the National Register of Historic Places. These areas coincide with many of the areas of weeds because of ongoing disturbances.

Recreation Area Operations

There continues to be significant disturbance from cattle trailing, heavy feral horse grazing, visitor use, park restoration activities, fires and the fluctuations of the Bighorn Reservoir. Extensive surveys of the park between 1998 and 2000 have shown that the weeds are confined to these areas of ongoing disturbance (See Appendix E) with areas of old disturbance like the 350 mining pits being weed free. The exception is compacted old cattle hangout areas that still show cheatgrass monocultures over 30 years after cessation of grazing. The noxious weeds are located along the cattle-trailing route, along the main roads, in visitor use areas, around the historic ranches and at the high water lines from extreme high water events. In the North District of Bighorn

Canyon National Recreation Area, there are spotted and diffuse knapweed patches along an airstrip at Ft. Smith, near the campgrounds and along the road to Ok-A-Beh Marina.

ENVIRONMENTAL CONSEQUENCES

METHODOLOGY

Potential impacts are described in terms of type (are the effects beneficial or adverse?), context (are the effects site-specific, local, or even regional?), duration (are the effects short-term, lasting less than one year, or long-term, lasting more than one year?), and intensity (are the effects negligible, minor, moderate, or major, or would the effects constitute impairment of the monument's resources and values?).

In addition, National Park Service's Management Policies 2001 (2000) require analysis of potential effects to determine whether or not actions would impair park resources. The fundamental purpose of the National Park System, established by the Organic Act and reaffirmed by the General Authorities Act, as amended, begins with a mandate to conserve park resources and values. National Park Service managers must always seek ways to avoid, or to minimize to the greatest degree practicable, adversely impacting park resources and values. However, the laws do give the National Park Service the management discretion to allow impacts to park resources and values when necessary and appropriate to fulfill the purposes of a park, as long as the impact does not constitute impairment of the affected resources and values. Although Congress has given the National Park Service the management discretion to allow certain impacts within parks, that discretion is limited by the statutory requirement that the National Park Service must leave park resources and values unimpaired, unless a particular law directly and specifically provides otherwise. The prohibited impairment is an impact that, in the professional judgment of the responsible National Park Service manager, would harm the integrity of park resources or values. An impact to any park resource or value may constitute impairment, but an impact would be more likely to constitute impairment to the extent that it has a major or severe adverse effect upon a resource or value whose conservation is:

- necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park;
- key to the natural or cultural integrity of the park; or
- identified as a goal in the park's general management plan or other relevant NPS planning documents.

Impairment may result from National Park Service activities in managing the park, visitor activities, or activities undertaken by concessionaires, contractors, and others operating in the park. A determination on impairment is made in the Environmental Consequences section for soils; cultural landscapes; water resources; biotic communities; threatened, endangered and candidate species and species of special concern; visitor use and experience; and recreation area operations.

CUMULATIVE IMPACT SCENARIO

The Council on Environmental Quality (CEQ) regulations, which implement the National Environmental Policy Act of 1969 (42 USC 4321 *et seq*.), require assessment of cumulative impacts in the decision-making process for federal projects. Cumulative impacts are defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions" (40 CFR 1508.7). Cumulative impacts are considered for both the no-action and preferred alternatives.

Cumulative impacts were determined by combining the impacts of the preferred alternative – Implementation of an integrated weed management program- with other past, present, and reasonably foreseeable future actions. Therefore, it was necessary to identify other ongoing or reasonably foreseeable future actions at Bighorn Canyon National Recreation Area and, if applicable, the surrounding region. Weed control is an ongoing process requiring cooperation with adjacent agencies and landowners as well as ongoing monitoring and treatment. Many of the treatments such as use of pesticides and bio-controls have potential cumulative effects that had to be considered. Past, present and future disturbances were also considered. These include the past disturbances of grazing, farming, wildfire, mineral exploration and the creation of the park road and facilities. Ongoing disturbances include cattle trailing, heavy grazing on the Pryor Mountain Wild Horse Range, reservoir fluctuations, visitor use and current historical restoration projects. Disturbances in the future would include the current ongoing disturbances as well as improving the common corral area on the cattle trailing route, new historic preservation and restoration projects, prescribed fire for habitat improvement and revegetation projects related to integrated weed management. Possible vectors of weed dissemination such as cattle, wild horses, National Recreation operations and visitor use were also considered. In the next decade, the lake around Horseshoe Bend may become a mudflat for most of the year with only a brief period of flooding. This would act as both an area of weed infestation as well as a source of new infestations. Other ongoing and future sources of weed seeds include the lands around the Shoshone and Bighorn Rivers upstream from the park and materials brought into the park such as hay, vehicles and gravel. In the future, new weed species such as yellow starthistle and dyers woad may become a problem in the Bighorn Basin.

Cumulative impacts of No Action were determined by looking at the history of weed invasions in the park and adjacent areas and the results of weed management activities over the past ten years. The health of the underlying plant and animal communities were assessed both in areas of weed management activities and in areas where little was done to control noxious weeds. The factors looked at for the No Action (current action) Alternative are essentially the same as that for the preferred alternative.

Cumulative Impacts of Alternative C- Control of weeds by non-Chemical Means Only- were determined by looking at the same actions and processes as in the preferred alternative with the exception of the cumulative impacts of future herbicide use.

IMPACTS TO CULTURAL RESOURCES AND §106 OF THE NATIONAL HISTORIC PRESERVATION ACT

In this environmental assessment/assessment of effect, impacts to cultural resources are described in terms of type, context, duration, and intensity, which is consistent with the regulations of the Council on Environmental Quality (CEQ) that implement the National Environmental Policy Act (NEPA). These impact analyses are intended, however, to comply with the requirements of both NEPA and §106 of the National Historic Preservation Act (NHPA). In accordance with the Advisory Council on Historic Preservation's regulations implementing §106 of the NHPA (36 CFR Part 800, Protection of Historic Properties), impacts to archeological resources and the cultural landscape were identified and evaluated by (1) determining the area of potential effects; (2) identifying cultural resources present in the area of potential effects that were either listed in or eligible to be listed in the National Register of Historic Places; (3) applying the criteria of adverse effect to affected cultural resources either listed in or eligible to be listed in the National Register; and (4) considering ways to avoid, minimize or mitigate adverse effects.

Under the Advisory Council's regulations a determination of either adverse effect or no adverse effect must also be made for affected National Register eligible cultural resources. An adverse effect occurs whenever an impact alters, directly or indirectly, any characteristic of a cultural resource that qualifies it for inclusion in the National Register (e.g. diminishing the integrity of the resource's location, design, setting, materials, workmanship, feeling, or association). Adverse effects also include reasonably foreseeable effects caused by the preferred alternative that would occur later in time, be farther removed in distance or be cumulative (36 CFR Part 800.5, Assessment of Adverse Effects). A determination of no adverse effect means there is an effect, but the effect would not diminish in any way the characteristics of the cultural resource that qualify it for inclusion in the National Register.

CEQ regulations and the National Park Service's *Conservation Planning, Environmental Impact Analysis and Decision-making* (Director's Order #12) also call for a discussion of the appropriateness of mitigation, as well as an analysis of how effective the mitigation would be in reducing the intensity of a potential impact, e.g. reducing the intensity of an impact from major to moderate or minor. Any resultant reduction in intensity of impact due to mitigation, however, is an estimate of the effectiveness of mitigation under NEPA only. It does not suggest that the level of effect as defined by §106 is similarly reduced. Although adverse effects under §106 may be mitigated, the effect remains adverse.

RESOURCE TOPIC 1: SOILS

METHODOLOGY

The soil maps of the National Recreation Area were reviewed and correlated with the observations of soil types where the weeds were located. Over a period of four years the condition of vegetation related to soil type and the effects of treatment was observed. Other observations included the potential

for weed infestation, the water infiltration and water holding potential, the response to compaction, the erodibility and ease of growing native vegetation in an arid climate. The effects of noxious weed on soil were reviewed and correlated with what was observed in the field. For purposes of analyzing impacts to soil resources, the thresholds of change for intensity of impact are:

Negligible: Soils would not be affected or the effects to soils would be below or at the lower levels of detection. Any effects to soil productivity or fertility would be slight and no long-term effects to soils would occur.

Minor: The effects to soils would be detectable. Effects to soil productivity or fertility would be small, as would the area affected. If mitigation were needed to offset adverse effects, it would be relatively simple to implement and would likely be successful.

Moderate: The effect on soil productivity or fertility would be readily apparent, likely long-term, and result in a change to the soil character over a relatively wide area. Mitigation measures would probably be necessary to offset adverse effects and would likely be successful.

Major: The effect on soil productivity or fertility would be readily apparent, long-term, and substantially change the character of the soils over a large area in and out of the monument. Mitigation measures to offset adverse effects would be needed, extensive, and their success could not be guaranteed

REGULATIONS AND POLICIES

Current laws and policies require that the following conditions be achieved in the park:

Desired Condition	Source
Prevent unnatural erosion	National Park Service's Management Policies 2001 (2000)
Avoid physical removal	
Avoid contamination of the soil	

IMPACTS OF ALTERNATIVE A-NO ACTION

Impact Analysis

There would be negligible direct impact on soils. There may be a short-term indirect impact from persistence of soil adsorbed herbicides under drought conditions but this would be minimized by using soil persistent herbicides sparingly and allowing one to three years to pass before reapplication of these herbicides in the same area. With the decrease in populations of noxious weeds that modify the soil like Russian knapweed and tamarisk, there would be a moderate beneficial indirect impact on

the soil's ability to sustain native plants because of the decrease in alleopathic substances, decreased salinity and improved hydrology. These beneficial effects would be limited to smaller infestations until resources are available to more effectively treat the larger infestations of soil changing noxious weeds.

Cumulative Effects

Many herbicides used under range conditions have the potential to build up if applied at too high a rate or too frequently. This risk is minimized by careful selection of the herbicide and time of spraying, keeping the amount of herbicide used at the minimal effective level and using other controls to decrease the amount of spraying needed. Impact on soils should be minor from buildup of herbicides.

Conclusion

There would be negligible direct impact on soils. There is potential for adverse indirect and cumulative effects but if the components of the integrated weed management program are followed, the adverse effects would be minor and short-term. Effective control of the weeds that change soils would have a moderate positive effect on the soils.

Because there would be no major adverse impacts to a resource whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of Bighorn Canyon National Recreation Area; (2) key to the natural or cultural integrity of the recreation area; or (3) identified as a goal in the recreation area's general management plan or other relevant National Park Service planning documents, Alternative A would result in no impairment of the recreation area's resources and values.

Because there would be no major adverse impacts to a resource whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of Bighorn Canyon National Recreation Area; (2) key to the natural or cultural integrity of the recreation area; or (3) identified as a goal in the recreation area's general management plan or other relevant National Park Service planning documents, Alternative A would result in no impairment of the recreation area's resources and values.

IMPACTS OF ALTERNATIVE B- PREFERRED ALTERNATIVE

Impact Analysis

There would be negligible direct impact on soils. There may be a short-term indirect impact from persistence of soil adsorbed herbicides under drought conditions but this would be minimized by using soil persistent herbicides sparingly and allowing one to three years to pass before reapplication of these herbicides in the same area. With the decrease in populations of noxious weeds that modify the soil like Russian knapweed and tamarisk, there would be a moderate beneficial indirect impact on the soil's ability to sustain native plants because of the decrease in alleopathic substances, decreased salinity and improved hydrology.

Cumulative Effects

Many herbicides used under range conditions have the potential to build up if applied at too high a rate or too frequently. This risk is minimized by careful selection of the herbicide and time of spraying, keeping the amount of herbicide used at the minimal effective level and using other controls to decrease the amount of spraying needed. Impact on soils should be minor from buildup of herbicides.

Conclusion

There would be negligible direct impact on soils. There is potential for adverse indirect and cumulative effects but if the components of the integrated weed management program are followed, the adverse effects would be minor and short-term. Effective control of the weeds that change soils would have a moderate positive effect on the soils.

Because there would be no major adverse impacts to a resource whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of Bighorn Canyon National Recreation Area; (2) key to the natural or cultural integrity of the recreation area; or (3) identified as a goal in the recreation area's general management plan or other relevant National Park Service planning documents, Alternative B would result in no impairment of the recreation area's resources and values.

INPACTS OF ALTERNATIVE C-NON-CHEMICAL MEANS ONLY

Impact Analysis

There would be negligible direct or indirect impacts to soils and no immediate change to existing conditions since no herbicides would be applied and the other weed control modalities would have negligible impact upon soils.

Cumulative Effects

Several of the targeted noxious weeds, especially the knapweeds and tamarisk have the potential over time to change the soils of the infested area. These plants can increase soil salinity, lay down alleopathic substances and alter soil structure. Russian knapweed is a rhizomatous species that that is little impacted by mechanical controls. Tamarisk seedlings can be pulled but once the tree is established, only a combination of mechanical and chemical control methods is effective. Neither species has effective bio-controls available. In well established, old infestations, these soil changes strongly affect the infested area's ability to be revegetated with native plant communities and will prevent normal succession to a native plant community from occurring. These adverse effects would be seen in areas heavily infested with tamarisk and/or Russian knapweed (they are often seen together in the Bighorn Basin) and would be of moderate intensity and long-term.

Conclusion

There would be negligible direct or indirect impacts to soils and no immediate change in existing conditions. However, over time, heavy infestations of weeds poorly control by non-chemical means alone would have a moderate impact on the chemical makeup and structure of the underlying soil that would make a return to a native plant community in historic time very difficult.

There would be no severe adverse impacts to a resource whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of Bighorn Canyon National Recreation Area; (2) key to the natural or cultural integrity of the recreation area; or (3) identified as a goal in the recreation area's general management plan or other relevant National Park Service planning documents. Therefore Alternative C would result in no impairment of the recreation area's resources and values.

RESOURCE TOPIC 2: CULTURAL LANDSCAPES

METHODOLOGY

In order for a cultural landscape to be listed in the National Register, it must meet one or more of the following criteria of significance: A) associated with events that have made a significant contribution to the broad patterns of our history; B) associated with the lives of persons significant in our past; C) embody the distinctive characteristics of a type, period, or method of construction, or represent the work of a master, or possess high artistic value, or represent a significant and distinguishable entity whose components may lack individual distinction; D) have yielded, or may be likely to yield, information important in prehistory or history (National Register Bulletin, How to Apply the National Register Criteria for Evaluation). The landscape must also have integrity of those patterns and features - spatial organization and land forms; topography; vegetation; circulation networks; water features; and structures/buildings, site furnishings or object- necessary to convey its significance (Secretary of the Interior's Standards for the Treatment of Historic Properties With Guidelines for the Treatment of Cultural Landscapes).

Bighorn Canyon National Recreation Area has no cultural landscapes on the National Register. The Mason-Lovell Ranch is probably the most historically important cultural landscape but it have been already so badly degraded by drought, noxious weeds and loss of its components, that it would longer be eligible for the National Register. The less significant but much better preserved Lockhart Ranch, Hillsboro and Ewing-Snell ranch are being considered for status as a historic district. To assess the potential for impacts from weeds, the location and distribution of historic cultivars was determined. The location, vectors, possible impacts and distribution of alien weedy pests and noxious weeds were assessed. For purposes of analyzing potential impacts to cultural landscapes, the thresholds of change for the intensity of an impact are defined as follows:

Negligible: Impact(s) is at the lowest levels of detection - barely perceptible and not measurable. For purposes of §106, the determination of effect would be no adverse effect

Minor: **Adverse:** impact would not affect a character defining pattern(s) or feature(s) of a National Register of Historic Places eligible or listed cultural landscape. For purposes of §106, the determination of effect would be no adverse effect.

Moderate: **Adverse:** impact would alter a character defining pattern (s) or feature(s) of the cultural landscape but would not diminish the integrity of the landscape to the extent that its National Register eligibility is jeopardized. For purposes of §106, the determination of effect would be no adverse effect.

Beneficial: rehabilitation of a landscape or its patterns and features in accordance with the Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes. For purposes of §106, the determination of effect would be no adverse effect.

Major: **Adverse:** impact would alter a character defining pattern(s) or feature(s) of the cultural landscape to the extent that it is no longer eligible for listing in the National Register. For purposes of §106, determination of effect would be adverse effect.

Beneficial: restoration of a landscape or its patterns and features in accordance with the Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes. For purposes of §106, the determination of effect would be no adverse effect.

REGULATIONS AND POLICIES

Current laws and regulations require that that the following conditions be achieved in the park:

Desired Condition	Source

The treatment of a cultural landscape will preserve significant physical attributes, biotic systems, and uses when those uses contribute to historical significance. Treatment decisions will be based on a cultural landscape's historical significance over time, existing conditions, and use. Treatment decisions will consider both the natural and built characteristics and features of a landscape, the dynamics inherent in natural processes and continued use, and the concerns of traditionally associated peoples. The treatment implemented will be based on sound preservation practices to enable long-term preservation of a resource's historic features, qualities, and materials. There are three types of treatment for extant cultural landscapes: preservation, rehabilitation, and restoration. Cultural landscapes are listed in the National Register when their significant cultural values have been documented and evaluated within appropriate thematic contexts and physical investigation determines that they retain integrity. Cultural landscapes are classified in the National Register as sites or districts or may be included as contributing elements of larger districts.	National Historic Preservation Act; Executive Order 11593; Archeological and Historic Preservation Act; the Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation; Programmatic Memorandum of Agreement Among the NPS, Advisory Council on Historic Preservation, and the National Council of State Historic Preservation Officers (1995); NPS Management Policies

IMPACTS OF ALTERNATIVE A: NO ACTION

Impact Analysis

There is some potential for direct adverse impact to cultivated plants associated with the cultural landscapes of the historic ranches within the park. The use of herbicides may damage plants significant in a cultural landscape such as hollyhocks, planted fruit trees, carageena, scotch broom, irises, rhubarb and asparagus. Under alternative A, these historic plants are marked each season and protected. Pulling or mowing of the nearby weeds would be used as an alternative to spraying but would not be implemented as much as in Alternative B. With these

protections already built into the program, impacts would be minor, localized and short-term.

There would be beneficial, long-term, direct and indirect impacts to the cultural landscapes. The noxious weeds threaten the visual aspects of these resources as well as the native and cultivated plant components. An integrated weed management program would enhance these resources while decreasing the incidence and density of noxious weeds. New infestations would be discouraged by revegetation of disturbances from historic restoration projects but in some cases this revegetation may be delayed. The risk of catastrophic fires would be reduced by control of flammable weedy species like cheatgrass near the historic buildings and fences.

Cumulative Effects

With management of the vegetation of the cultural landscapes in a manner that decreases the noxious weeds and protects the cultivated and native plants, the result over time would be a moderate improvement in the condition of these resources that would be long-term.

Conclusion

There would be minor adverse impacts to cultural landscapes that would be localized and short-term. There would be moderate beneficial direct and indirect impacts. The cumulative result of such integrated management would be a moderate improvement in the visual and vegetative components of these resources.

Because there would be no major adverse impacts to a resource whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of Bighorn Canyon National Recreation Area; (2) key to the natural or cultural integrity of the recreation area; or (3) identified as a goal in the recreation area's general management plan or other relevant National Park Service planning documents, Alternative A would result in no impairment of the recreation area's resources and values.

IMPACTS OF ALTERNATIVE B: PREFERRED ACTION

Impact Analysis

There is some potential for direct adverse impact to cultivated plants associated with the cultural landscapes of the historic ranches within the park. The use of herbicides may damage plants significant in a cultural landscape such as hollyhocks, planted fruit trees, carageena, scotch broom, irises, rhubarb and asparagus. Under alternative B, these historic plants are marked each season and protected. Pulling or mowing of the nearby weeds would be used as an alternative to spraying. With these protections built into the program, impacts would be minor, localized and short-term.

There would be beneficial, long-term, direct and indirect impacts to the cultural landscapes. The noxious weeds threaten the visual aspects of

these resources as well as the native and cultivated plant components. An integrated weed management program would enhance these resources while decreasing the incidence and density of noxious weeds. New infestations would be discouraged by early revegetation of disturbances from historic restoration projects. The risk of catastrophic fires would be reduced by control of flammable weedy species like cheatgrass near the historic buildings and fences.

Cumulative Effects

With management of the vegetation of the cultural landscapes in a manner that decreases the noxious weeds and protects the cultivated and native plants, the result over time would be a moderate improvement in the condition of these resources that would be long-term.

Conclusion

There would be minor adverse impacts to cultural landscapes that would be localized and short-term. There would be moderate beneficial direct and indirect impacts. The cumulative result of such integrated management would be a moderate improvement in the visual and vegetative components of these resources.

Because there would be no major adverse impacts to a resource whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of Bighorn Canyon National Recreation Area; (2) key to the natural or cultural integrity of the recreation area; or (3) identified as a goal in the recreation area's general management plan or other relevant National Park Service planning documents, Alternative B would result in no impairment of the recreation area's resources and values.

IMPACTS OF ALTERNATIVE C-NON-CHEMICAL MEANS ONLY

Impact Analysis

There would be negligible direct impacts to the cultural landscapes of Bighorn Canyon National Recreation Area since weed treatments like mechanical controls and bio-control agents would have little effect upon the desired cultivars. There would be a moderate, long-term indirect impact in that the increasing amount of weeds such as Canada thistle, Russian knapweed, whitetop, houndstongue, western sticktights and mustards would adversely impact the cultural landscape. Poorly controlled cheatgrass infestations have the potential to increase the risk of hot, fast moving fires around the historic buildings. With the exception of houndstongue and Canada thistle, the weeds around the cultural landscapes do not respond well to non-chemical controls.

Cumulative Effects

Without effective control, the weeds around the historic ranches will over time threaten the vegetative components of the cultural landscape such as the hollyhocks, carageena, irises, rhubarb and pasture grasses. The early and expected new infestations of Russian knapweed along the

cattle trailing route near the three ranches being considered for status as a historic district are very poorly controlled by non-chemical means alone. Overall cumulative effects should be moderate, long-term and seen around all of the historic ranches in the recreation area.

Conclusion

There would be negligible direct impacts but there would be moderate, long-term indirect impacts to the cultural landscapes of Bighorn Canyon National Recreation Area since failure to control the weeds at the historic ranches would result in a high risk of loss of historic cultivars and increased risk of catastrophic fire near the flammable components of the cultural landscape. Cumulatively, the presence of uncontrolled Russian knapweed, cheatgrass and whitetop near the ranches has the potential to adversely the cultural landscapes since these weeds can change the vegetative characteristics of these historic areas. The cumulative effects would be of moderate intensity and long-term.

There would be no major adverse impacts to a resource whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of Bighorn Canyon National Recreation Area; (2) key to the natural or cultural integrity of the recreation area; or (3) identified as a goal in the recreation area's general management plan or other relevant National Park Service planning documents. Therefore Alternative C would result in impairment of the recreation area's resources and values.

RESOURCE TOPIC 3: WATER RESOURCES (Water Quality, Wetlands and Floodplains)

METHODOLOGY

Available information on riparian resources of Bighorn Canyon National Recreation Area was reviewed. This included information on the riparian corridors along the feeder streams to the Bighorn River including Crooked Creek, Layout Creek. Trail Creek and Davis Creek. The fluctuations of the Bighorn River and reservoir are mapped and information on the relationship of snow pack and summer rain to water level was considered. Springs and seeps were located as well as wetlands. Because the relationship of water to previous development, the riparian corridors and wetlands all tend to be near weed areas. Baseline data on water quality from October 1998 was reviewed including the measurements of herbicides. The potential impacts of each alternative on wetlands, floodplains, riparian areas and water quality were evaluated by comparing their locations to identified weed areas and effects of potential treatment of the weeds. Predictions about short and long-term impacts were based on studies and experience with weed management in the Bighorn Basin. For purposes of analyzing potential impacts to wetlands, floodplains and water quality, the thresholds of change for the intensity of an impact are defined as follows:

Negligible: Wetlands or floodplains would not be affected or the effects to the resource would be below or at the lower levels of detection. No long-term effects to wetlands or floodplains would occur and any detectable effects would be slight. No U.S. Army Corps of Engineers 404

permit would be necessary Neither water quality nor hydrology would be affected, or changes would be either non-detectable or if detected, would have effects that would be considered slight, local, and short-term.

Minor: The effects to wetlands or floodplains would be detectable and relatively small in terms of area and the nature of the change. A U.S. Army Corps of Engineers 404 permit would not be required. No long-term effects to wetlands or floodplains would occur. Changes in water quality or hydrology would be measurable, although the changes would be small, would likely be short-term, and the effects would be localized. No mitigation measure associated with water quality or hydrology would be necessary.

Moderate: The alternative would result in effects to wetlands or floodplains that would be readily apparent, including a long-term effect on wetland vegetation, such that an U.S. Army Corps of Engineers 404 permit could be required. Wetland or floodplain functions would not be affected in the long-term. Changes in water quality or hydrology would be measurable and long-term but would be relatively local. Mitigation measures associated with water quality or hydrology would be necessary and the measures would likely succeed.

Major: Effects to wetlands or floodplains would be observable over a relatively large area, would be long-term, and would require a U.S. Army Corps of Engineers 404 permit. The character of the wetland or floodplain would be changed so that the functions typically provided by the wetland or floodplain would be substantially changed. Changes in water quality or hydrology would be readily measurable, would have substantial consequences, and would be noticed on a regional scale. Mitigation measures would be necessary and their success would not be guaranteed

REGULATIONS AND POLICIES

Current laws and policies require that the following conditions be achieved in the park:

Desired Condition	Source
There will be no additional contamination Of surface water or aquifers by toxic chemicals	NPS Policies, Clean Water Act
Water quality shall be protected for surface and underground aquifers	NPS Policies Clean Water Act
Wetlands, floodplains and riparian areas should not be adversely affected by by park actions	Executive Order 11990, Protection of Wetlands Executive Order 11988, Floodplain Management

IMPACTS OF ALTERNATIVE A-NO ACTION

Impact Analysis

Water Quality- No herbicide would be applied near the lake, ponds and irrigation ditches that was not approved for use near water. Some of the targeted weeds, especially Russian knapweed and tamarisk, are found at the high water line after extreme events. In years of normal flood pool the maximum water line is well below the weed patch and the vegetation has desert characteristics. The decision to spray these patches is based partly upon the estimates of snowpack and the risk for one of these extreme high water events. These predictions are very reliable since they are based upon Basin wide precipitation and not subject to variation from localized rain events.

Wetlands-Targeted weeds, especially Canada thistle, are found in the marshy pastures and along the previous irrigation ditches of four of the five historic ranches. For these wet areas, the only herbicides used are those like Rodeo that is approved and formulated for use near water. The spray is applied in small amounts from a backpack sprayer to target weeds only. No herbicide not approved for use near water is applied in these wet pastures or near waterways. These areas have high priority for bio-control measures further reduce the risk of herbicide impact upon wetlands. Mechanical controls like mowing also have a place in management of weeds in wetlands but use of this modality is limited by lack of staff and functional equipment.

Groundwater-Many of the herbicides used (See Appendix D) are highly soluble and have high potential for leaching. However in Bighorn Canyon National Recreation Area, the herbicides are usually applied to soils that are high in impermeable clays that swell when wet. Bulk density is very high in these clays and moisture does not penetrate more that a few inches before it starts evaporating during the summer spraying season. The water table is these areas are 40 to 100 ft. deep. For example, in areas like the Mason-Lovell Ranch, which is on the historic flood plain of the Bighorn River, well-established old cottonwoods die when their irrigation is discontinued because the water table is too deep for their roots to reach it. The areas where the soil is more permeable are the limestone plateaus and the pluvial gravel benches. In these sites, there are no targeted weeds and the water table is consistently more than 50 feet deep. Under the protocols of the integrated weed management program, the risk for spraying each area with a particular herbicide would be assessed using the RAVE score (See Appendix D.) and if the score was unacceptably high an alternative treatment or a less soluble herbicide would be used. Risk for groundwater contamination is very low if the herbicides are applied in compliance with the label and selected for low risk of groundwater contamination using the RAVE scoring system.

Floodplains-No spraying would be done on the flood pool area (the usual high water level of the reservoir) since the prolonged inundation of the reservoir flood pool kills the weeds in the flood pool area at least every few years. The weeds on the flood plain (the area flooded only in

extreme high water events for a short period of time) would be treated with a combination of mechanical, bio-controls and chemical controls to reduce the amount of chemicals needed. For example, the treatment of choice for tamarisk on the flood plain would be basal spraying and the cut and spray method rather than foliar spraying. If the only effective herbicides for a particular noxious weed are not approved for use on areas subject for flooding, they would be applied in years where the high water mark is projected to be below the usual flood pool level. Under Alternative A, there would be limited treatment of the large infestations on the floodplains.

Direct and indirect impacts to water resources would be negligible to minor and short-term with the integrated management approach of Alternative A, and the adverse impacts would be less than the impacts of the noxious weeds. Partial control of noxious weeds like tamarisk, Russian knapweed and Canada thistle would have a minor, long-term beneficial effect on wetlands and floodplains. Native vegetation would be given a better chance to out compete the weeds in selected areas near visitor use areas.

Cumulative Effects

With repeated mowing and herbicide use there may be some minor changes in the plant composition and amount of evaporation in the infested wetlands. However in these wetlands, management would not be required unless there were already significant noxious weed infestations impacting the function of the wetland. The cumulative impacts would be negligible to minor and probably less than the impacts of the noxious weeds.

Conclusion

Impacts to water resources would be negligible to minor.

Because there would be no major adverse impacts to a resource whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of Bighorn Canyon National Recreation Area; (2) key to the natural or cultural integrity of the recreation area; or (3) identified as a goal in the recreation area's general management plan or other relevant National Park Service planning documents, Alternative A would result in no impairment of the recreation area's resources and values.

IMPACTS OF ALTERNATIVE B-PREFERRED ACTION

Impact Analysis

Water Quality- No herbicide would be applied near the lake, ponds and irrigation ditches that was not approved for use near water. Some of the targeted weeds, especially Russian knapweed and tamarisk, are found at the high water line after extreme events. In years of normal flood pool the maximum water line is well below the weed patch and the vegetation has desert characteristics. The decision to spray these patches is based partly upon the estimates of snowpack and the risk for one of these

extreme high water events. These predictions are very reliable since they are based upon Basin wide precipitation and not subject to variation from localized rain events.

Wetlands-Targeted weeds, especially Canada thistle, are found in the marshy pastures and along the previous irrigation ditches of four of the five historic ranches. For these wet areas, the only herbicides used are those like Rodeo that is approved and formulated for use near water. The spray is applied in small amounts from a backpack sprayer to target weeds only. No herbicide not approved for use near water is applied in these wet pastures or near waterways. These areas have high priority for bio-control measures and mechanical control to further reduce the risk of herbicide impact upon wetlands.

Groundwater-Many of the herbicides used (See Appendix D) are highly soluble and have high potential for leaching. However in Bighorn Canyon National Recreation Area, the herbicides are usually applied to soils that are high in impermeable clays that swell when wet. Bulk density is very high in these clays and moisture does not penetrate more that a few inches before it starts evaporating during the summer spraying season. The water table is these areas are 40 to 100 ft. deep. For example, in areas like the Mason-Lovell Ranch that is on the historic flood plain of the Bighorn River, well established old cottonwoods die when their irrigation is discontinued because the water table is too deep for their roots to reach it. The areas where the soil is more permeable are the limestone plateaus and the pluvial gravel benches. In these sites, there are no targeted weeds and the water table is consistently more than 50 feet deep. Under the protocols of the integrated weed management program, the risk for spraying each area with a particular herbicide would be assessed using the RAVE score (See Appendix D.) and if the score were unacceptably high an alternative treatment or a less soluble herbicide would be used. Risk for groundwater contamination is very low if the herbicides are applied in compliance with the label and selected for low risk of groundwater contamination using the RAVE scoring system.

Floodplains-No spraying would be done on the flood pool area (the usual high water level of the reservoir) since the prolonged inundations of the reservoir flood pool kills the weeds in the flood pool area at least every few years. The weeds on the flood plain (the area flooded only in extreme high water events for a short period of time) would be treated with a combination of mechanical, bio-controls and chemical controls to reduce the amount of chemicals needed. For example, the treatment of choice for tamarisk on the flood plain would be basal spraying and the cut and spray method rather than foliar spraying. If the only effective herbicides for a particular noxious weed are not approved for use on areas subject for flooding, they would be applied in years where the high water mark is projected to be below the usual flood pool level.

Direct and indirect impacts to water resources would be negligible to minor and short-term with the integrated management approach of Alternative B and the adverse impacts would be less than the impacts of the noxious weeds. Control of noxious weeds like tamarisk, Russian knapweed and Canada thistle would have a moderate, long-term beneficial effect on wetlands and floodplains. Native vegetation would be given a better chance to out compete the weeds. The water tables in areas previously infested by tamarisk would rise and the amount of weed seed

floating downstream would be decreased.

Cumulative Effects

With repeated mowing and herbicide use there may be some minor changes in the plant composition and amount of evaporation in the infested wetlands. However in these wetlands, management would not be required unless there were already significant noxious weed infestations impacting the function of the wetland. The cumulative impacts would be negligible to minor and probably less than the impacts of the noxious weeds.

Conclusion

Impacts to water resources would be negligible to minor.

Because there would be no major adverse impacts to a resource whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of Bighorn Canyon National Recreation Area; (2) key to the natural or cultural integrity of the recreation area; or (3) identified as a goal in the recreation area's general management plan or other relevant National Park Service planning documents, Alternative B would result in no impairment of the recreation area's resources and values.

IMPACTS OF ALTERNATIVE C-NON-CHEMICAL MEANS ONLY

Impact Analysis

There would be negligible direct impacts to groundwater, wetlands, floodplains or surface water resources, and no change to existing conditions. There would be no herbicides applied and no alterations related to soil disturbances near these resources. There could be minor, localized and adverse indirect effects in some of the wetlands where mowing of Canada thistle could cause an alteration of the wetland plant communities but these changes would be short-term since Canada thistle can be controlled by non-chemical means.

Cumulative Effects

The past history of the floodplain of the Bighorn and Shoshone Rivers suggests that with each high water event, additional seedlings of tamarisk and Russian knapweed become established at the high water mark. Both of these species show evidence of spreading off the high water mark and up the streams flowing into the river. As described before, dense stands of tamarisk can significantly lower the water table in the area of infestation. Russian knapweed is capable of spread directly to the drylands above the high water mark. With no weed actions, the "bathtub ring" of noxious weeds would continue to increase in area and density and the water table of the areas around the floodplain would drop. For both tamarisk and Russian knapweed, non-chemical controls alone are not effective in controlling their establishment or spread. A leaf-eating insect is being tested on tamarisk and showing promise but it is not yet approved for general release. Because of the rhizomatous nature of

Russian knapweed, effective bio-control agents are unlikely to be found. The cumulative effects of using non-chemical means alone for these floodplain weeds would be of moderate intensity, long-term and localized to the flood plain and adjacent areas.

Conclusion

There would be negligible to minor direct or indirect impacts to water quality, wetlands and floodplains that would be localized and short-term. However there would be a moderate, long-term, adverse impact on plant communities adjacent to the rivers with an increase in noxious weeds and increased seeding of the weeds downstream as well as drops in the water table near and on the floodplain.

There would be no major adverse impacts to a resource whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of Bighorn Canyon National Recreation Area; (2) key to the natural or cultural integrity of the recreation area; or (3) identified as a goal in the recreation area's general management plan or other relevant National Park Service planning documents. Therefore Alternative C would result in no impairment of the recreation area's resources and values.

RESOURCE TOPIC 4: BIOTIC COMMUNITIES

METHODOLOGY

Bighorn Canyon National Recreation Area has some very unique plant communities, especially the cushion plant communities of the basin grasslands and windswept plateaus. In these arid, windy environments, the plants show the same adaptations as the plants in alpine areas above timberline. Even plant species that are tall and bushy in less difficult environments become small and rounded in response to the low moisture and high wind. Four of the plant species of special concern in the state of Montana are endemic to these communities. These areas were identified using the maps and definitions from Knight's Vegetation Ecology of Bighorn Canyon National Recreation Area. Another unique type of plant community is found in the calcium rich seeps and springs. Some of these communities are near developed areas or the historic ranches. To assess risk to these plant communities, maps from Knight and Heidel and Fertig's Rare Plant Survey of Bighorn Canyon National Recreation Area were compared with the mapped locations of noxious weeds and areas of known disturbance. Sites at risk were visited, especially the springs in the Trail Creek drainage, the cushion plant communities near the cattle trailing route and a previous wildfire to assess for evidence of weed invasion. Multiple visits were made over a period of three years

Other communities that are of concern are the neotropical birds that use the creek woodlands associated with the historic ranches extensively. The initial survey data was reviewed as well as three years worth of Audubon Club records from Bighorn Canyon National Recreation Area and staff observations of the bird life. These records helped determine where the birds were most likely to be and when nesting occurred. The Bighorn sheep also use the area around Hillsboro. Their response to weed

management activity was determined by asking the USGS researchers working on the sheep populations.

For purposes of analyzing impacts to biotic communities, the thresholds of change for intensity of impact are:

Negligible: Biotic communities would not be affected or the effects would be at or below the level of detection, would be short-term, and the changes would be so slight that they would not be of any measurable or perceptible consequence to plant or wildlife species' populations and interactions.

Minor: Effects to biotic communities would be detectable, although the effects would be localized, and would be small and of little consequence to the plant or wildlife species' populations and interactions. Mitigation measures, if needed to offset adverse effects, would be simple and successful

Moderate: Effects to biotic communities would be readily detectable, long-term and localized, with consequences at the population and community structure level. Mitigation measures, if needed to offset adverse effects, would be extensive and likely successful.

Major: Effects to biotic communities would be obvious, long-term, and would have substantial consequences to plant and wildlife populations in the region as well as community interactions. Extensive mitigation measures would be needed to offset any adverse effects and their success would not be guaranteed.

REGULATIONS AND POLICIES

Current laws and policies require that the following conditions be achieved in the park:

Desired Condition	Source
Populations of native plant and animal species function in as natural a condition as possible	National Park Service's Management Policies 2001(2000)
Management of populations of exotic plant species will be undertaken when such species threaten park natural resources and control is prudent and feasible	National Park Service's Management Policies2001(2000) Executive Order 13112 Invasive Species

IMPACTS OF ALTERNATIVE A-NO ACTION

Impact Analysis

The vast majority of noxious weed infestations are located in areas of repeated disturbance where the native biotic communities are already heavily impacted (See Appendix E). Such areas include the high water line of the Bighorn Reservoir, the cattle trailing routes and former agricultural areas. In other areas, such as former grazing areas, right of ways and visitor use areas, the noxious weeds threaten the native plant communities. Under Alternative A, management is geared to enhancement of native (or historic) plant communities. Where there is a good under story of native plants, herbicide use will be minimal and applied very locally with a backpack sprayer. Narrow spectrum herbicides will be used rather than broad-spectrum herbicides. Other means of control such as pulling and selective bio-controls, will be intermittently used either alone or as an adjunct to herbicides. Drift of herbicides can cause unacceptable damage to native plant communities but can be minimized by spraying only when the wind is less than five miles per hour, using low pressure nozzles and selecting suitable adjuvants.

All herbicides selected are approved for range use and have very low adverse impacts on animals including insects and vertebrates when applied as directed. The selected bio-controls will have been screened by the Department of Agriculture for potential to impact the native insects and plants. There would be minor potential for impact to nesting birds and bighorn sheep in the riparian areas near the historic ranches from weed management activities in May but these disturbances would be no more than the disturbance from visitor use since the only activities would be spraying with a backpack sprayer and hand pulling. Activities such as mowing would occur after the nesting season is completed.

There would be minor, short-term and localized direct or indirect adverse impacts on biotic communities.

Cumulative Effects

With repeated treatments, there may be some short-term changes in the composition of biotic communities such as temporary decrease in the native grasses and forbs. However with control of the noxious weeds, research has shown that there is a significant improvement in the native species richness and diversity when compared with the pre-weed control status. However control is likely to be achieved in the smaller infestations only. The cumulative adverse impacts would be minor and short-term. The cumulative beneficial effects would be of minor intensity and long-term.

Conclusion

There would be minor, short-term and localized adverse direct or indirect impacts to biotic communities. Any adverse cumulative impacts would be short-term and minor. Long-term cumulative impacts would be of minor benefit to biotic communities.

Because there would be no major adverse impacts to a resource whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of Bighorn Canyon National Recreation Area;

(2) key to the natural or cultural integrity of the recreation area; or (3) identified as a goal in the recreation area's general management plan or other relevant National Park Service planning documents, Alternative A would result in no impairment of the recreation area's resources and values.

IMPACTS OF ALTERNATIVE B-PREFERRED ACTION

Impact Analysis

The vast majority of noxious weed infestations are located in areas of repeated disturbance where the native biotic communities are already heavily impacted (See Appendix E). Such areas include the high water line of the Bighorn Reservoir, the cattle trailing routes and former agricultural areas. In other areas, such as former grazing areas, right of ways and visitor use areas, the noxious weeds threaten the native plant communities. Under the preferred alternative, management is geared to enhancement of native (or historic) plant communities. Where there is a good under story of native plants, herbicide use will be minimal and applied very locally with a backpack sprayer. Narrow spectrum herbicides will be used rather than broad-spectrum herbicides. Other means of control such as pulling and selective bio-controls, will be used either alone or as an adjunct to herbicides. Areas heavily impacted with noxious weeds will be seeded with native (or culturally correct grasses in old pastures) plants after weed control. Drift of herbicides can cause unacceptable damage to native plant communities but can be minimized by spraying only when the wind is less than five miles per hour, using low pressure nozzles and selecting suitable adjuvants.

All herbicides selected are approved for range use and have very low adverse impacts on animals including insects and vertebrates when applied as directed. The selected bio-controls will have been screened by the Department of Agriculture for potential to impact the native insects and plants. There would be minor potential for impact to nesting birds and bighorn sheep in the riparian areas near the historic ranches from weed management activities in May but these disturbances would be no more than the disturbance from visitor use since the only activities would be spraying with a backpack sprayer and hand pulling. Activities such as mowing would occur after the nesting season is completed.

There would be minor, short-term and localized direct or indirect adverse impacts on biotic communities.

Cumulative Effects

With repeated treatments, there may be some short-term changes in the composition of biotic communities such as temporary decrease in the native grasses and forbs. However with control of the noxious weeds, research has shown that there is a significant improvement in the native species richness and diversity when compared with the pre-weed control status. The cumulative adverse impacts would be minor and short-term. The cumulative beneficial effects would be of moderate intensity and the long-term.

Conclusion

There would be minor, short-term and localized adverse direct or indirect impacts to biotic communities. Any adverse cumulative impacts would be short-term and minor. Long-term cumulative impacts would be of moderate benefit to biotic communities.

Because there would be no major adverse impacts to a resource whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of Bighorn Canyon National Recreation Area; (2) key to the natural or cultural integrity of the recreation area; or (3) identified as a goal in the recreation area's general management plan or other relevant National Park Service planning documents, Alternative B would result in no impairment of the recreation area's resources and values.

IMPACTS OF ALTERNATIVE C-NON-CHEMICAL MEANS ONLY

Impact Analysis

There would be a moderate, long-term, adverse direct impact on native plant communities adjacent to the areas of noxious weeds if Alternative C is taken. The knapweeds all have potential of spreading into and replacing undisturbed native desert and riparian vegetation. Diffuse and spotted knapweeds can be controlled with hand pulling before blooming but the sheer size of these infestations in the North District puts this modality well beyond the resources of the park staff. Russian knapweed is a rhizomatous species that cannot be controlled by mechanical means. Bio-controls are available for spotted knapweed but the circumstances in which they can be used are limited. Tamarisk and Canada thistle are spreading in wetter areas such as along streams and in marshy areas. The use of only non-chemical means may be effective against Canada thistle but not tamarisk. Since mowing would be done after mid-June, impact upon nesting birds would be negligible. Many of the noxious weeds have indirect effects related to changes in soil and loss of forage for herbivores. Because of the invasive nature of noxious weeds and resistance of many of them to non-chemical controls alone, there will continue to be change of native biotic communities by weeds if alternative C is selected.

Cumulative Effects

The longer noxious weed infestations are uncontrolled, the more difficult to control. Many of these weeds change the environment they grow in. This may preclude the growth of other species. The older infestations have a larger seed bank. Old and dense infestations of noxious weeds usually have a very depauperate understory so even if the weed is killed, there are few seeds or roots of native plants to fill in the void so the result is re-infestation. Use of non-chemical means alone would fail to control most of the noxious weeds in Bighorn Canyon National Recreation Area that would have a moderate, adverse cumulative impact on biotic communities adjacent to current noxious weed infestations and areas of recent and/on ongoing disturbance.

Conclusion

There would be moderate direct, indirect and cumulative impacts on biotic communities if Alternative C were selected. These impacts would be long-term and most pronounced in high water mark areas by the reservoir, the riparian areas near the historic ranches, the North District of Bighorn Canyon National Recreation Area and in native plant communities within a quarter mile of the park road.

There would be no major adverse impacts to a resource whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of Bighorn Canyon National Recreation Area; (2) key to the natural or cultural integrity of the recreation area; or (3) identified as a goal in the recreation area's general management plan or other relevant National Park Service planning documents. Therefore Alternative C would result in no impairment of the recreation area's resources and values.

RESOURCE TOPIC 5: THREATENED, ENDANGERED AND CANDIDATE SPECIES AND SPECIES OF SPECIAL CONCERN

METHODOLOGY

National Endangered Species Act Reform Coalition, the Wyoming Natural Diversity Database and Montana Natural Heritage Program were contacted via the internet to generate a list of threatened, endangered and "species of special concern" for Bighorn County, Wyoming and Carbon County, Montana (see Appendix F). Phone consultation was obtained from the wildlife specialists of Montana Parks and Wildlife and Wyoming Game and Fish. The Montana and Wyoming State Offices for the US Fish and Wildlife Service were also contacted by phone with a description of the proposed program. A follow-up letter was sent (May 21, 2003) and the recommendations incorporated into the EA. The list was compared with the draft National Park Species database for Bighorn Canyon National Recreation Area, Wyoming G&F Biological Services data base, the U.S. Fish and Wildlife Service database in Billings, Montana and the results of ongoing surveys for small mammals and reptiles and amphibians that are being carried out as part of the NPS inventory and monitoring process. The plants on the Natural Heritage Data Management System lists were compared with the lists generated by Heidel and Fertig which is the most current documentation of the areas flora. It includes status and location as well as habitat of the plant species of special concern. The park's records concerning locations of peregrine aeries and bald eagle nesting sites was compared with the current locations of weed areas. The Audubon bird count records were consulted since they contain the most current sightings.

The only threatened or endangered species identified as being in the park was the bald eagle. Other animals on the T&E lists have not been seen in or near Bighorn Canyon National Recreation Area nor were there suitable habitat for them. The potential impacts on the recently delisted peregrine falcon were also considered since the walls of the Bighorn Canyon are peregrine falcon habitat. The bats are found in the Pryor Mountains and cave areas well away from weed areas. The milk snake

has been found in higher seeps at the base of Sykes Mountain but has not been sighted near the areas of disturbance where noxious weeds occur (see Appendix F). Six plants are listed as species of special concern in Montana and/or Wyoming. None of them (Sullivantia hapemanii, Rorippa calycina, Erigeron allocotus, Stanleya tomentosa, Astragalus oreganus and Eriogonum brevicaule var. canum) are located in mapped weed areas but with spread of weeds into natural areas, they may be at risk. The Sullivantia is at especially high risk since its habitat is the calcium rich seeps and springs and several large colonies occur in the Trail Creek Drainage.

For purposes of analyzing impacts to biotic communities, the thresholds of change for intensity of impact are:

Negligible: No federally listed or state listed species would be affected. If the alternative would affect an individual of a listed species or its critical habitat, the change would be so small that it would not be of any measurable or perceptible consequence to the protected individual or its population. Negligible effect would equate with a “no effect” determination by the U.S. fish and wildlife service.

Minor: The effect on an individual(s) of a listed species or its critical habitat may be seen but the change would be small. Minor effect would equate with a "may effect" determination in U.S. Fish and Wildlife Service terms and would be accompanied by a statement of "likely…" or "not likely to adversely affect" the species

Moderate: The effect on an individual or population of a listed species, or its critical habitat would be noticeable. The effect could have some long-term consequence to the individual, population, or habitat. Moderate effect would equate with a "may effect" determination in U.S. Fish and Wildlife Service terms and would be accompanied by a statement of "likely…" or "not likely to adversely affect" the species

Major: The effect on an individual or population of a listed species, or its critical habitat, would be noticeably affected with a long-term, vital consequence to the individual, population, or habitat. Major effect would equate with a "may effect" determination in U.S. Fish and Wildlife Service terms and would be accompanied by a statement of "likely…" or "not likely to adversely affect" the species or critical habitat

REGULATIONS AND POLICIES

Current laws and policies require that the following conditions be achieved for threatened and endangered species and species of special concern:

Desired Condition	Source
Federal and state-listed threatened and endangered species and their	Endangered Species Act NPS Management

Policies
habitats are sustained.
National Environmental Policy Act

Populations of native plant and
Executive Order 13112, Invasive Species
animal species function in as
natural condition as possible except
where special management
NPS Management Policies
considerations are warranted

IMPACTS OF ALTERNATIVE A-NO ACTION

Impact Analysis

The Park has one threatened (Bald Eagle) and one recently delisted (Peregrine Falcon) species. The mountain plover has been sighted rarely during migration but does not nest in the area. The bat species of special concern are found along canyon walls and cliffs far from the targeted weeds areas. Milk snakes have also been seen in remote rocky areas well away from the disturbed weed areas. The pesticides selected have low toxicity to animals and present little risk even if grazed right after spraying. There are six identified globally rare plants in the park that are not on the T&E list. These plants have been mapped by GPS and a GIS file is used to determine proximity to the targeted weeds. So far, there are no identified weed infestations adjacent to the identified species at risk. Since the weeds tend to be in the disturbed lowlands and the rare plants on the semi- desert uplands, potential for proximity is low. The exceptions are Sullivantia hapemanii and Rorippa calycina. Sullivantia is found near one of the historic ranches (Hillsboro) and the Trail Creek Campground where they have potential to be adversely impacted by Canada thistle and tamarisk. Currently these weeds are far away from the colonies of Sullivantia. Rorippa has been found on the flood plain of the Bighorn River and its vulnerability to noxious weeds has not been determined. It appears to tolerate flooding better than tamarisk or Russian knapweed but with prolonged drought and low water levels may be out-competed by these weeds. Near the natural areas, the weeds would be sprayed exclusively with a backpack sprayer with careful attention to preventing drift and collateral damage to non-target plants. If plants species of concern are present, hand pulling of weeds is the modality of choice. Potential for adverse direct and indirect impacts on these species of concern is very low because the weeds tend to be where the species of concern are not.

Cumulative Effects

The herbicides selected have shown no tendency to be concentrated in the food chain of carnivores such as the bald eagle. Several of the noxious weeds, e.g. spotted knapweed (Centaurea bieberstenii) and tamarisk, have shown the potential to invade the upland areas of the plant species of concern. Tamarisk, Canada thistle and Russian knapweed can also invade the wetlands where other species of concern are located. Over time, eradication of these weeds in and near the uplands would have a beneficial impact on these plant species. There would be no adverse cumulative impact from Alternative A.

Conclusion

There would be negligible direct or indirect adverse impacts to threatened, endangered and candidate species or species of special concern. There would be a moderate beneficial cumulative impact on plant species of special concern related to protection from noxious weed infestation.

Because there would be no significant adverse impacts to a resource whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of Bighorn Canyon National Recreation Area; (2) key to the natural or cultural integrity of the recreation area; or (3) identified as a goal in the recreation area's general management plan or other relevant National Park Service planning documents, Alternative A would result in no impairment of the recreation area's resources and values.

IMPACTS OF ALTERNATIVE B- PREFERRED ACTION

Impact Analysis

The Park has one threatened (Bald Eagle) and one recently delisted (Peregrine Falcon) species.. The mountain plover has been sighted rarely during migration but does not nest in the area. The bat species of special concern are found along canyon walls and cliffs far from the targeted weeds areas. Milk snakes have also been seen in remote rocky areas well away from the disturbed weed areas. The pesticides selected have low toxicity to animals and present little risk even if grazed right after spraying. There are six identified globally rare plants in the park that are not on the T&E list. These plants have been mapped by GPS and a GIS file is used to determine proximity to the targeted weeds. So far, there are no identified weed infestations adjacent to the identified species at risk. Since the weeds tend to be in the disturbed lowlands and the rare plants on the semi- desert uplands, potential for proximity is low. The exceptions are Sullivantia hapemanii and Rorippa calycina. Sullivantia is found near one of the historic ranches (Hillsboro) and the Trail Creek Campground where they have potential to be adversely impacted by Canada thistle and tamarisk. Currently these weeds are far away from the colonies of Sullivantia. Rorippa has been found on the flood plain of the Bighorn River and its vulnerability to noxious weeds has not been determined. It appears to tolerate flooding better than tamarisk or Russian knapweed but with prolonged drought and low water levels may be out-competed by these weeds. Near the natural areas, the weeds would be sprayed exclusively with a backpack sprayer with careful attention to preventing drift and collateral damage to non-target plants. If plants species of concern are present, hand pulling of weeds is the modality of choice. Potential for adverse direct and indirect impacts on these species of concern is very low because the weeds tend to be where the species of concern are not.

Cumulative Effects

The herbicides selected have shown no tendency to be concentrated in the

food chain of carnivores such as the bald eagle. Several of the noxious weeds, e.g. spotted knapweed and tamarisk, have shown the potential to invade the upland areas of the plant species of concern. Tamarisk, Canada thistle and Russian knapweed can also invade the wetlands where other species of concern are located. Over time, eradication of these weeds in and near the uplands would have a beneficial impact on these plant species. There would be no adverse cumulative impact from Alternative B.

Conclusion

There would be negligible direct or indirect adverse impacts to threatened, endangered and candidate species or species of special concern. There would be a moderate beneficial cumulative impact on plant species of special concern related to protection from noxious weed infestation.

Because there would be no significant adverse impacts to a resource whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of Bighorn Canyon National Recreation Area; (2) key to the natural or cultural integrity of the recreation area; or (3) identified as a goal in the recreation area's general management plan or other relevant National Park Service planning documents, Alternative B would result in no impairment of the recreation area's resources and values.

IMPACTS OF ALTERNATIVE C- NON-CHEMICAL MEANS ONLY

Impact Analysis

There would be negligible direct or indirect impacts to threatened, endangered and candidate species and species of special concern, and no change to existing conditions. There would be no herbicide use and non-chemical means of weed control would not have any adverse impact on non-target species.

Cumulative Effects

Spread of noxious weeds would have a minor impact on some communities of plant species of special concern. The communities most at risk are those rocky plateau and desert species like Erigeron allocotus that are in areas adjacent to spreading infestations of Russian knapweed and the wet areas where Sullivantia hapemanii and Rorippa calycina are located. The small patches of spotted knapweed in the South District are amenable to mechanical controls but the more invasive, rhizomatous Russian knapweed infestations are not. Canada thistle, which may threaten the Sullivantia, is controllable with non-chemical means but tamarisk is not.

Conclusion

There would be negligible direct or indirect impacts to Threatened, Endangered and Candidate Species and Species of Special Concern. There would be minor cumulative effects related to impact to some localized

plant communities by invasive noxious weeds over time but they would be localized.

There would be no major impacts to a resource whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of Bighorn Canyon National Recreation Area; (2) key to the natural or cultural integrity of the recreation area; or (3) identified as a goal in the recreation area's general management plan or other relevant National Park Service planning documents. Therefore Alternative C would result in no impairment of the recreation area's resources and values.

RESOURCE TOPIC 6: VISITOR USE AND EXPERIENCE

METHODOLOGY

Visitor surveys and personal observation of visitation patterns combined with what is available to visitors under current management were used to estimate the effects of the alternatives. The impact on the ability of the park visitor to enjoy and experience was analyzed by considering the impact on multiple visitor uses including fishing, camping, hiking, picnicking, sight seeing, boat launching and wildlife watching. For visitor use and experience, the thresholds of change for the intensity of an impact are defined as follows:

Negligible: Visitors would likely not be aware of changes associated with the presence of alien weed pests or noxious weeds.

Minor: Visitors would likely be aware of the changes associated with alien weed pests and noxious weeds and the effect on their own use and enjoyment of park resources. However, the changes in visitor use and experience would be slight and likely short-term

Moderate: Visitors would be aware of the effects associated with alien weed pests and noxious weeds and the effect on their own use and enjoyment of park resources. Changes in visitor use and experience would be readily apparent and likely long-term. The park would remain available for other visitor experience and use without derogation of park resources and values, but visitor satisfaction may be measurably affected.

Major: Visitors would be highly aware of the effects associated with alien weed pests and noxious weeds and the effect on their own use and enjoyment of park resources. Changes in visitor use and experience would be readily apparent and long-term. The change in visitor use and experience proposed in the alternative would preclude future generations of some visitors' enjoyment of park resources and values.

IMPACTS OF ALTERNATIVE A- NO ACTION

Impact Analysis

Herbicides are selected for low human toxicity. The time of spraying near visitor use areas is selected to minimize the numbers of people potentially present. The appropriate “Pesticide-No entry" signs are placed around sprayed visitor use areas for the period of time indicated on the labeling or until the spray is dry. This time period is usually 24 hours or less. The adverse direct and indirect impacts on visitor use and experience from herbicide use would be minor, localized and short-term. The use of other weed control modalities would have no adverse direct or indirect impact in visitor use and experience. There would be a direct beneficial impact where spiny or prickly weeds like Canada thistle, houndstongue (Cynoglossum officinale), burdock (Arctium minus) and western sticktight (Lapula occidentalis) in visitor use areas would be eliminated before setting seed. Use of mechanical methods for the control of these species would be limited but the result would be unsatisfactory control rather than increased herbicide use.

Cumulative Effects

Effective control of noxious weeds over a period of time would have a moderate beneficial effect on visitor use and experience. For most visitors, the flowers of many noxious weeds are attractive but as the public becomes better educated to the dangers of noxious weeds and the biotic communities become visibly degraded by weeds, the charm of the flowering weeds decreases. Control of noxious weeds would enhance the visitor use experience by enhancing the components of the native biotic communities that many visitors come to see and/or study.

Conclusion

There would be minor, localized and short-term adverse direct and indirect impacts to visitor use and experience. There would be minor to moderate beneficial cumulative impacts related to the improvement in the health and diversity of the biotic communities.

IMPACTS OF ALTERNATIVE B-PREFERRED ACTION

Impact Analysis

Herbicides are selected for low human toxicity. The time of spraying near visitor use areas is selected to minimize the numbers of people potentially present. The appropriate “Pesticide-No entry" signs are placed around sprayed visitor use areas for the period of time indicated on the labeling or until the spray is dry. This time period is usually 24 hours or less. The adverse direct and indirect impacts on visitor use and experience from herbicide use would be minor, localized and short-term. The use of other weed control modalities would have no adverse direct or indirect impact in visitor use and experience. There would be a direct beneficial impact where spiny or prickly weeds like Canada thistle, houndstongue, burdock and western sticktight in visitor use areas would be eliminated before setting seed.

Cumulative Effects

Effective control of noxious weeds over a period of time would have a

moderate beneficial effect on visitor use and experience. For most visitors, the flowers of many noxious weeds are attractive but as the public becomes better educated to the dangers of noxious weeds and the biotic communities become visibly degraded by weeds, the charm of the flowering weeds decreases. Control of noxious weeds would enhance the visitor use experience by enhancing the components of the native biotic communities that many visitors come to see and/or study.

Conclusion

There would be minor, localized and short-term adverse direct and indirect impacts to visitor use and experience. There would be minor to moderate beneficial cumulative impacts related to the improvement in the health and diversity of the biotic communities.

IMPACTS OF ALTERNATIVE C- NON-CHEMICAL MEANS ONLY

Impact Analysis

There would be negligible direct impacts to visitor use and experience. The problem of visibility around guardrails, signs and park facilities can be managed with mowing and other mechanical means. There would still be production of seeds that can be carried on clothes, hair, shoes etc. from visitor use areas to other places resulting in a minor indirect impact that is localized to visitor use areas.

Cumulative Effects

Over time, the increase in some weed species that do not respond well to non-chemical means of control, especially the whitetop, Russian knapweed, poison ivy and Russian thistle would decrease the quality of the visitor experience, especially in visitor use areas like the historic ranches and campgrounds. Loss of native communities to noxious weed invasion would decrease visitor use and experiences related to study and enjoyment of the native plants and animals of this desert park.

Conclusion

There would be negligible direct and minor indirect impacts to visitor use and experience that would be localized to visitor use areas but long-term. Cumulatively, the increase in noxious and irritating weeds in visitor use areas would have a moderate adverse impact on the visitor use and experience.

RESOURCE TOPIC 7: RECREATION AREA OPERATIONS

Methodology

The effect on Recreation Area operations was assessed by looking at the effects of weeds and weed management on operations not associated with weed management such as construction and restoration projects and maintenance of

visitor use areas. For Recreation Area operations the thresholds of change for the intensity of an impact are defined as follows:

Negligible: Recreation Area operations would not be affected, or the effects would be at low levels of detection and would not have an appreciable effect on park operations.

Minor: The effect would be detectable and likely short-term, but would be of a magnitude that would not have an appreciable effect on monument operations. If mitigation was needed to offset adverse effects, it would be simple and likely successful.

Moderate: The effects would be readily apparent, likely long-term, and would result in a substantial change in park operations in a manner noticeable to staff and toe public. Mitigation measure would be necessary to offset adverse effects and would likely be successful

Major: The effects would be readily apparent, long-term, would result in a substantial change in park operation in a manner noticeable to staff and the pubic and be markedly different from existing operations. Mitigation measure to offset adverse effects would be needed, would be extensive and their success could not be guaranteed.

IMPACTS OF ALTERNATIVE A- NO ACTION

Impact Analysis

Since herbicide application, pulling, mowing and revegetation of recently disturbed areas are all surface activities, risk to the infrastructure serving the park facilities such as power lines, cables and water lines is low. Also under Alternative A, use of mechanical modalities and revegetation would be somewhat limited to small, highly visible areas. The areas with these infrastructures are confined to the Ft. Smith Administrative areas and Horseshoe Bend. All weed spraying staff is trained in safe use of pesticides and the prescribed PPE is made available and maintained. Unused herbicides and containers are disposed of in accordance to the labeling. The spraying and other weed control modalities are scheduled so as not to interfere with other park operations. Any areas likely to be used by park staff that are sprayed with herbicide are posted with “No Entry” signs until the spray is dry or for the amount of time recommended on the herbicide label. Areas where revegetation may be needed are not located in areas associated with day to day operations of the park. The direct and indirect impacts of Alternative A would be minor and short-term.

Cumulative Effects

There would be negligible cumulative impacts on recreation area operations since the only impacts would be during the time of the treatment and immediately afterward.

Conclusion

There would be minor, localized and short-term direct or indirect impacts on recreation area operations from Alternative A. Cumulative impacts on recreation area operations would be negligible.

IMPACTS OF ALTERNATIVE B-PREFERRED ACTION

Impact Analysis

Since herbicide application, pulling, mowing and revegetation of recently disturbed areas are all surface activities, risk to the infrastructure serving the park facilities such as power lines, cables and water lines is low. The areas with these infrastructures are confined to the Ft. Smith Administrative areas and Horseshoe Bend. All weed spraying staff is trained in safe use of pesticides and the prescribed PPE is made available and maintained. Unused herbicides and containers are disposed of in accordance to the labeling. The spraying and other weed control modalities are scheduled so as not to interfere with other park operations. Any areas likely to be used by park staff that are sprayed with herbicide are posted with “No Entry” signs until the spray is dry or for the amount of time recommended on the herbicide label. Areas where revegetation may be needed are not located in areas associated with day to day operations of the park. The direct and indirect impacts of Alternative B would be minor and short-term.

Cumulative Effects

There would be negligible cumulative impacts on recreation area operations since the only impacts would be during the time of the treatment and immediately afterward.

Conclusion

There would be minor, localized and short-term direct or indirect impacts on recreation area operations from Alternative B. Cumulative impacts on recreation area operations would be negligible.

IMPACTS OF ALTERNATIVE C- NON-CHEMICAL MEANS ONLY

Impact Analysis

There would be minor direct impacts to recreation area operations because the amount of time spent in mowing and doing other mechanical treatment in maintenance and storage areas would be much more than the time that would be spent in chemical treatments. There would be the additional moderate impact in that while the height of weeds in the rights of ways areas can be controlled with mowing, the task of keeping the weeds out of areas that are targeted for being bare of weeds is far beyond the capabilities of the park staff. These impacts would be localized and short-term.

Cumulative Effects

There would be moderate cumulative effects on recreation area operations from Alternative C. Poor control of rights of way weeds would increase the spread of weeds from the maintenance and storage areas. Visibility and access to these areas would decrease.

Conclusion

There would be minor, localized and short-term direct and indirect impacts to recreation area operations. Cumulative effects would be of moderate intensity in the areas used for maintenance and resource management storage and activities.

CONSULTATION AND COORDINATION

AGENCIES AND ORGANIZATIONS

Agencies and organizations contacted for information; or that assisted

in identifying important issues, developing alternatives or analyzing impacts; or that will review and comment upon the environmental assessment include:

Bureau of Land Management, Cody, Wyoming and Billings, Montana offices

Custer National Forest

Hanebury, Lou- Wildlife Biologist, US Fish and Wildlife Service, Billings, Montana

Pomeroy, Alan - Weed Specialist, Bighorn County Weed and Pest

Stewart, Shawn - Wildlife Biologist, Montana Department of Fish, Wildlife and Parks

Tribal Chairman of the Crow Nation

Wilmoth, Stan - State Archeologist, Montana State Historic Preservation Office

Wyoming Game and Fish

York, Darryl, Wildlife Biologist, US Fish and Wildlife Service, Cheyenne, Wyoming

PREPARER

Suzanne Morstad- Vegetation Ecologist, Bighorn Canyon National Recreation Area

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Bob Byrne- Assistant Superintendent

Chris Finley- Archeologist

Laura Gianakos- Water Specialist

Rick Lasko- Integrated Resource Program Manager,

Terry Peters- Retired Natural Resource Manager

Brooke Simpson- Archeologist

National Park Service Intermountain Region Support Offices

Pam Benjamin- Vegetation Ecologist

Gerald McCrea- Pest Management Specialist

LIST OF ENVIRONMENTAL ASSESSMENT RECIPIENTS

The following agencies, or organizations will be sent copies of the environmental assessment:

Wyoming State Historic Preservation Office-already sent

Montana State Historic Preservation Office-already sent

Wyoming Weed and Pest, Bighorn County

Custer National Forest

Tribal Chairman of the Crow Nation

BLM, Cody, Wyoming and Billings, Montana Offices

Wyoming Game and Fish

Montana Department of Fish, Wildlife and Parks

Montana Department of Environmental Quality

US Fish & Wildlife Service, Cheyenne, Wyoming Office

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GLOSSARY OF SCIENTIFIC TERMS

Bio-controls-Insects or other animals that feed upon an alien plant in its native environment

Cultural Controls- Changes in land management that discourage weeds, e.g. winter cattle grazing

Chemical Controls-Use of herbicides

Revegetation- Planting of an infested area with desirable plants that can out compete a noxious weed after it had been reduced by other controls.

Weed Colonization-Presence of a plant pest in an area without significant alteration of the native plant community

Weed Infestation-Presence of a plant pest that alters the native plant community in a significant manner.

APPENDIX A: News Release and Request for Comments

FOR IMMEDIATE RELEASE **Contact: Suzanne Morstad**
December 10, 2001 **(307) 548-2251**

INTEGRATED WEED MANAGEMENT PROGRAM

Bighorn Canyon National Recreation Area is in the initial stages of planning and public involvement for an integrated weed management program.

Noxious weeds are a significant problem for many of our public lands and Bighorn Canyon NRA is no exception. An integrated weed management program is being developed to control or eradicate these infestations in a manner that will cause the least possible damage to the environment. This program would use a variety of carefully selected techniques such as mowing, spraying, bio-control insects and pulling.

As part of the "scoping" process for this program, the National Park Service is asking the public to become involved and to help shape program development. The purpose of this notice is to solicit comments on what concerns might exist and on ideas that might be useful in further refining the program.

Any questions, suggestions or concerns about the proposed program or requests for more information should be sent to program manager Suzanne Morstad at (307) 548-2251 or mailed to Bighorn Canyon NRA, 20 Hwy 14Alt, Lovell, Wyo. 82431. E-mails should be addressed to Suzanne_Morstad@nps.gov. Please submit your comments by January 11, 2002.

APPENDIX B: Scoping Statement

SCOPING STATEMENT

REQUEST FOR PUBLIC COMMENTS

NATIONAL PARK SERVICE
Bighorn Canyon National Recreation Area

Program Name: Integrated Weed Management Program
Counties: Bighorn County, Wyo.; Bighorn and Carbon and Bighorn Counties, Mt.

Legal Description: Multiple sites within the boundaries of Bighorn Canyon NRA

Proposed Decision Date: Late Winter 2002
Proposed Implementation Date: May 2002-Oct. 2007

Dear Interested Party:

Introduction- Noxious weeds are recognized as one of the greatest threats facing native vegetation communities in the West. These highly invasive alien plant species have already caused significant loss of livestock and wildlife forage through out the West and have the potential to invade essentially intact native vegetative communities. Because of the amount of previous and ongoing disturbance, Bighorn Canyon National Recreation Area has multiple sites of noxious weed infestation and vectors for spread of these weeds that threaten the unique native plant communities of the park.

The National Park Service has a commitment to preserving natural communities for the use and enjoyment of future generations. The incursion of noxious alien plant species jeopardizes these natural communities.

In response to the current and potential weed infestations, Bighorn Canyon NRA is developing an integrated weed management program to control or eradicate current weed infestations and prevent significant new noxious weed infestations. This program will include the use of mechanical, biological and chemical controls as well as education, revegetation and management of disturbance.

The Park feels we have an opportunity to protect natural plant communities and adjacent lands from noxious weed infestation with minimal damage to the native plants and animals of the Recreation Area.

Once established, noxious weeds are difficult and expensive to eradicate. In large infestations, prevention of spread may be the only feasible action. Early detection and eradication is of vital importance as is ongoing monitoring. Use of single methods of control is not effective or ecologically sound. A weed management program must include multiple modalities appropriate to the biology of each targeted noxious weed species.

PUBLIC INVOLVEMENT-

Bighorn Canyon NRA is in the initial stages of a planning and public involvement process for this Integrated Weed Management Program

As a starting point, we are suggesting a “proposed action” in this scoping statement that represents an opportunity for the public to become involved and to help shape the project development and implementation. The proposed action is one alternative we could implement to meet the goals for the park. It may or may not be the final decision. This proposed action gives us a place to begin our analysis and allows the public to begin suggesting other ways we might achieve the goals.

By developing a “proposed action”, the public has a proposal to react to, which helps people focus on what concerns might exist and what comments to make to be most useful in further refining the program. We need to involve you and identify ways to modify the initial proposal, if needed, based upon local residents knowledge of the area and possible concerns about how the program is implemented. This is why your comments and input are important.

The purpose of this letter is to solicit written comments from all concerned

parties to help us design and implement this program. Your comments and suggestions are needed and encouraged. Project alternatives will be determined and environmental consequences analyzed during the National Environmental Policy Act (NEPA) process initiated by this scoping letter. Additional information, the purpose, need and proposed action are described in the following sections.

BACKGROUND

The land that became Bighorn Canyon NRA in 1966 has a history of over 80 years of human use including ranching, farming, mining and dude ranching. After the creation of Bighorn Lake by the Yellowtail Dam, repeated high water and low water events added to the disturbance, especially in the southern part of the park. Cattle trailing and grazing have continued in the park under the terms of its creation. Heavy use of the range by the horses has impacted the park portion of the Pryor Mountain Horse Range. Visitor use and NPS activities add to the ongoing disturbance and potential for spread of noxious weeds.

Currently the park has significant noxious weed infestations in areas of previous and ongoing disturbance, especially in the Yellowtail Habitat, around the Crooked Creek area and in the North District near Ft. Smith. The targeted weeds include Russian, spotted and diffuse knapweed, tamarisk, Canada thistle, houndstongue and whitetop. Most of these weeds in the South District north of Sykes Mountain and in the North District have been mapped. The Yellowtail Habitat is scheduled for weed mapping in 2003-2004. So far, over 180 acres of these noxious weeds have been mapped and with the addition of the Yellowtail Habitat noxious weeds, the total may be in the thousands of acres.

Safety-

The herbicides to be used will be only those approved for range use. These chemicals have been proven to be safe around grazing mammals and other animals when applied as recommended. If chemicals are to be used around visitor use areas, they will be posted for no entry during the recommended period of time. Ground and surface water pollution will be prevented by using the RAVE system which determines potential for pollution based upon soil and water table characteristics as well as characteristics of the chemical. All recommended safety precautions on the labeling shall be implemented.
Bio-controls will be selected for their specificity and low risk for similar native vegetation. All selected bio-controls shall be approved by the USDA.

To reduce the use of chemicals, other means such as cutting, mowing, pulling and competitive plantings will be utilized as much as possible to achieve control.

PURPOSE AND NEED

As previously mentioned, the National Park Service is obligated to preserve natural communities by controlling alien invasive plants. Because of the biological adaptations of these plants and the vulnerability of the native plants to weed control methods, weed management is complicated. It also requires a well thought out, long term campaign that emphasizes the health of the natural plant

communities.

An Integrated Weed Management Program that effectively uses all available tools in a biologically sound manner is essential to the preservation of native plant communities. The goal of an Integrated Weed Management Program is not “killing weeds”. It is protection and enhancement of the native plant communities.

The proposed plan would be implemented in 2002. It would continue indefinitely with periodic review since the problem of noxious weed invasion is not going to go away. As local eradication and control is achieved, the emphasis will shift to monitoring of previous infestations and prevention of new infestations. In some areas, the goal may be “holding the line” against spread of a heavy infestation that cannot be eradicated.

The Integrated Weed Management Program would involve mapping of the targeted noxious weeds, determination of the biologic integrity of the infested areas, mechanical controls, chemical controls, revegetation, prevention of weed spread and bio-controls. Monitoring the results of the interventions and for new infestations will be an integral part of the program at all stages of its implementation. Protection of native vegetation is the first priority of this program.

EXISTING CONDITIONS(where we are now)- Much of the lowlands along the Bighorn River were used for agriculture before creation of Bighorn Lake by the Yellowtail Dam. These areas were already subject to infestation by common agricultural weeds such as whitetop and Canada thistle. With the presence of the dam, high water events spread millions of seeds of Russian knapweed and tamarisk over the floodplains, especially in the Yellowtail Habitat. These areas now have major infestations of multiple noxious weeds with severe damage to the native floodplain vegetation. Other areas used for ranching and agriculture were impacted by tilling and/or overgrazing leaving disturbed ground open for invasion by Canada thistle, houndstongue, whitetop, spotted and diffuse knapweed. Much of the area in the North District by Ft. Smith in infested with spotted and diffuse knapweed, houndstongue and Canada thistle. In the South District similar infestations are seen around the historic ranches, along the cattle trailing route and between Crooked Creek and Horseshoe Bend. The weeds are the same as in the North District except for the lack of diffuse knapweed(so far) and the addition of whitetop. These weeds are being spread into the native plant communities away from the road into areas disturbed by fire and excessive horse trampling on fragile soils.

Bighorn Canyon National Recreation Area is an elongated park with three different noxious weed problems. 1) The part of the Yellowtail Habitat managed by the National Park service is heavily infested with many of the large heavy infestations occurring in areas hard to treat such as in wetlands or riparian cottonwood groves. This area needs to be mapped with identification of areas that can be positively impacted by weed control activities. 2) The South District north of Sykes Mountain has mostly weed free native vegetation except for areas of disturbance such as the historic ranches, roadsides and high water areas around the reservoir. This area has been mapped for noxious weeds and shows good potential for eradication or control of the targeted weeds except for a large infestation of Russian knapweed around Crooked Creek. 3) The North

District shows evidence of previous and ongoing disturbance with large but sparse noxious weed infestations along all access corridors and visitor use areas. This area has been mapped with about 50 acres of diffuse and spotted knapweed identified. This includes corridors owned by other agencies that the NPS is responsible for such as the 11 mile road to Ok-A-Beh and 3 miles of the road east of Ft. Smith.

Disturbance continues to be a concern within the park. Visitor use and park service activities disturb the land as well as act as a source of weed seeds. Each high water event on Bighorn Lake brings in a massive compliment of weed seeds and spreads them over disturbed lands. Cattle trailing and wild horse grazing trample the native vegetation and fragile soil crusts, leaving bare areas where weeds can become established. The cattle and horses also carry the seeds of the knapweeds and houndstongue along their trailing routes. Prescribed fires and wildfires leave bare areas that are easily colonized by cheatgrass, Canada thistle and houndstongue. Control of noxious weeds in the park may depend upon control of disturbance, weed seed sources and vectors as much as it does upon weed treatments.

PROGRAM GOALS-

The primary purpose of an Integrated Weed Management Program is to manage the vegetation of Bighorn Canyon NRA in such a manner as to preserve and enhance the native vegetative communities and suppress the proliferation of noxious weeds.

-Control disturbance as much as possible and revegetate disturbed areas.

-Identify those areas at risk for massive weed infestation and preventing expansion of noxious weeds into these areas.

-Identify early weed colonizations and eradicate them in a timely manner

-Do minimal damage to the native plants in areas where noxious weeds occur

This program is needed to:

- Restore areas of weed infestation with good biologic integrity to weed free areas of native vegetation
- Prevent the spread of noxious weeds into areas free of weeds
- Prevent the spread of noxious weeds to adjacent non-park lands
- Prevent the deterioration of forage values caused by weed infestation
- Enhance the health and vigor of native plant communities by controlling the invasive alien plants

DESIRED FUTURE CONDITIONS (where we want to be)

By decreasing the amount of disturbance and revegetating disturbed areas in a timely manner, there will be less area that is subject to noxious weed infestation.

Areas that currently have noxious weeds associated with a fair to good cover of desirable native plants will either be completely weed free (weed eradication) or the weeds will be present in such low numbers that

they do not impact the function of the native plant community (control)

Areas with heavy noxious weed infestations and a poor cover of desirable native plants will be identified. Control measures will keep these infestations from expanding into uninfested areas. With a combination of focused weed control and revegetation, the borders of these larger infestations will be gradually pushed back

Vectors and sources of weed seeds will be decreased. Early weed colonizations will be eradicated before they can turn into infestations of native plant communities.

The weed management program will do minimal damage to the native plants and no discernable damage to the native animals in the park

Since the program depends upon the use of multiple control methods, use of herbicides will eventually be decreased below historic level of use.

THE PROPOSED ACTION

By developing a proposed action, the public has a proposal to react to. This helps people focus on what concerns might exist and what comments to make that would be most useful in further refining the project.

Who is proposing this program?

The National Park Service has a directive to manage land under its stewardship in a manner that preserves and protects the natural environment. This includes control and if possible, eradication of alien invasive species in a manner that does not adversely impact the natural environment to a significant degree. The Integrated Weed Management Program is being developed by the staff of Bighorn Canyon National Recreation Area in accordance to the Integrated Pest Management guidelines of the National Park Service and recommendations from Wyoming and Montana Weed and Pest Services.

National Park Service personnel are seeking public comments to help plan and carry out this program. The purpose of scoping is to identify issues and concerns related to the proposed actions. In addition, scoping may identify additional information and management opportunities that may be incorporated into the proposed action as well as formulating alternatives to the proposed actions. Input will be used to determine the nature and complexity of the proposed action, identify environmental and other issues to the proposed action and determine the level of NEPA analysis necessary.

Why is the project being proposed?

The rationale for the proposed project is described in the previous introduction, background, purpose and need.

Where is the proposed program?

The integrated weed management program would involve the entire land

acreage of Bighorn Canyon NRA, especially in the weed search, mapping and monitoring aspects. Actual areas of treatment would be confined to areas of disturbance and noxious weed infestations

When would the program occur?

The proposed decision date would be in the early winter of 2002. Program implementation would begin in May of 2003. The project would continue indefinitely with periodic review and revision (at least every five years)

What is being proposed?

An interdisciplinary team of resource specialists would review and analyze the effects of the proposed program in relation to issues raised during the internal and public scoping process. The team will develop program design features for implementation of the project.

The proposed action would be designed to comply with the Integrated Pest Management Guidelines of the National Park Service and Director's Order # 12.

The specifics of the proposed program include:

- All areas of noxious weed infestation will be mapped with description of the condition of the plant communities in areas of infestation.
- Priority for treatment will be given to early infestations of noxious weeds in areas of good biologic integrity.
- Another priority will be prevention of weed infestation by public education, control of disturbance and control of seed sources and vectors as much as is feasible.
- Treatment of each infestation will include a variety of modalities including hand pulling, mowing, judicious spraying, fire, bio-controls, grazing and revegetation. The selection of modalities and timing will depend upon the biology of each targeted weed species and the underlying plant community.
- Herbicides will be selected for their safety to animals and humans. The herbicides will be as selective for target species as possible and damage to desirable plants will be minimized by the appropriate selection of treatment techniques.
- Risk of ground and surface water contamination will be reduced by applying the RAVE criteria for safety based upon soil, herbicide and ground water characteristics.
- All herbicides will be used in compliance with the labeling and state guidelines.
- All bio-control agents will be selected for specificity and safety to native plants. All bio-control agents shall be approved by the USDA.
- Non-herbicide methods of control will be used wherever feasible based upon the biology of the target species.
- In many areas, eradication of noxious weeds will not be feasible. These areas will be identified and goal will be control or containment.
- The results of each treatment will be assessed yearly and treatment plans modified accordingly.

- Areas of previous noxious weed infestation and areas at risk for infestation will be monitored on a regular basis.

POSSIBLE ALTERNATIVES

- No action alternative –No attempt would be made to control noxious beyond hand pulling of small patches of weeds and some mowing
- Alternative actions would be analyzed if issues and concerns related to the proposed action were identifies and could not be addressed through program planning or mitigation
- Proposed action-The program would be authorized as proposed

NATURE OF DECISION

The decision would be made is whether or not to authorize the proposed Integrated Weed Management Program or an alternative to the program. Also the decision could include what mitigation measures need to be applied to the program. Based upon public comment from this scoping notice and environmental analysis, the National Park Service determines whether significant issues or concerns exist. If there are any, they will be addressed in the analysis and eventual decision.

CONTACTS

The public is provided this opportunity to identify and submit issues and concerns they feel the National Park Service should address. If you feel we have overlooked something or have additional information, comments should be as specific as possible to assist us in the analysis. To be most helpful, comments should be submitted in writing no later than 2/8/02

For further information, contact project leader Suzanne Morstad at (307) 548- 2251. Written comments can be mailed to Attention-Suzanne Morstad, Bighorn Canyon National Recreation Area, 20 hwy 14A, Lovell, Wyo. 823431.

Please remember that your comments are important to us.

Sincerely,

Rick Lasko
Chief of Resource Management

APPENDIX C: Letter to the Crow Nation

United States Department of the Interior
National Park Service

Bighorn Canyon National Recreation Area
P. O. Box 7458
Fort Smith, Montana 59035
406-666-2412

In Reply Refer To:
A3815(BICA-SD)

October 2, 2002

Crow Tribal Council
ATTN: Acting Chairman
P.O. Box 159
Crow Agency, MT 59022

Dear Mr. Chairman:

Bighorn Canyon National Recreation Area is proposing an integrated weed management program for the park including the North District. This program would involve the use of multiple techniques to control weeds including mowing, release of weed eating insects, spraying and reseeding areas that have weeds because they are already bare of grasses. Some of these techniques such as mowing and spraying are already being used to some extent as part of ongoing management of the park. The sprays to be used are all approved for range use and safe for use near people and where cattle are grazing. In addition to park-managed lands, lands around Government Camp, the Yellowtail and Afterbay dams, the park is also responsible for weed control on the road to Three-Mile Access and the eleven-mile road to Ok-A-Beh.

The National Recreation Area is also working on reclamation of the approximately 350 abandoned uranium exploration sites in the South District of Bighorn Canyon National Recreation Area. The sites that are on existing mining roads will be re-contoured by backhoe where possible. The sites that are near to archeological sites, biologically sensitive areas, or are inaccessible to a backhoe will be re-contoured by hand. The sites will then be planted with native seed. Enclosed is a map showing the location of these sites and the known archeological sites.

Before proceeding with the full development of a detailed plan for weed control and further reclamation of the abandoned mineral sites, we would like to hear any concerns, suggestions or objections the Crow Nation might have to these activities. Please address your comments, in writing, to Chief, Resources Management, Rick Lasko, 20 Highway 14A East, Lovell, Wyoming 82431.

Sincerely,

Darrell J. Cook
Superintendent

APPENDIX D: RAVE System of Assessing Risk for Groundwater Contamination

RAVE: Relative Aquifer Vulnerability Evaluation

An on-farm scoring system to evaluate aquifer vulnerability to pesticide

contamination; 2nd Ed.

Introduction

Pesticide applicators of today are faced with growing concern over the potential for pesticide contamination of ground water. Over 50% of all Montanan's and 95% of the agricultural community consume ground water as their source of drinking water. Protecting this fragile resource from pesticide contamination is imperative, because some pesticides may be harmful to humans at very low concentrations and clean-up of ground water is extremely difficult. Pesticide residues in ground water may also adversely affect sensitive crops and wildlife.

To help farmers and pesticide applicators reduce the potential for contaminating ground water with pesticides, an aquifer vulnerability scoring system; RAVE: Relative Aquifer Vulnerability Evaluation has been developed. This numeric scoring system helps individuals evaluate pesticide selection for on-site ground water contamination potential. RAVE is designed only as a guidance system and does not replace the need for safe and judicious pesticide application required in all situations.

In most cases pesticide contamination of ground water can be avoided by using common sense and following label instructions. However, some areas are particularly vulnerable to pesticide contamination and thus require special consideration prior to making an application. The use of this score card may indicate whether an alternative pesticide should be used within a given area or if the area is not suited to pesticide applications.

Several major factors in a particular area determine the relative vulnerability of ground water to pesticide contamination. Nine of these factors have been incorporated into the RAVE score card and are defined below. A Value for most of these factors can be determined by a simple on-site inspection. If a value for a particular factor is not known, contact the appropriate agency for assistance. A listing of agency contacts is provided below. Pesticide leaching potential is based on the soil persistence and mobility of a pesticide. A list of leaching potentials for some commonly used pesticides is given on pages 3-4.

Factor Definitions

Irrigation Practice: A rating based on whether a field is flood, sprinkler or non-irrigated.

Depth to Ground Water: The distance, in vertical feet, below the soil surface to the water table.

Distance to Surface Water: The distance, in feet, from the field boundary to the nearest flowing or stationary surface water.

Percent Organic Matter: The relative amount of decayed plant residue in the soil (see soil test results, county soil survey or consult the SCS). This may be estimated by soil color; darker soil generally indicates higher organic matter (most Montana soils are < 3 %).

Pesticide Application Frequency: The number of times the particular pesticide is applied during one growing season.

Pesticide Application Method: A rating based on whether the pesticide is applied above or below ground.

Pesticide Leachability: A relative ranking of the potential for a pesticide to move downward in soil and ultimately contaminate ground water based upon the persistence, sorptive potential and solubility of the pesticide.

Topographic Position: Physical surroundings of the field to which the pesticide application is to be made. Flood plain = within a river or lake valley, Alluvial Bench = lands immediately above a river or lake valley, Foot Hills = rolling uplands near mountains, Upland Plains = high plains not immediately affected by open water or mountains.

Sources of Information

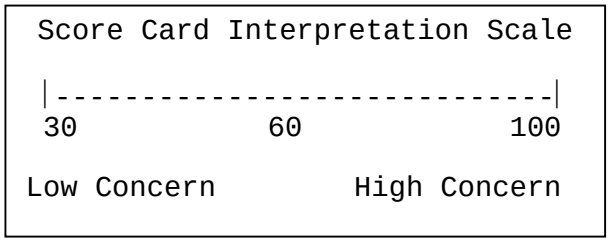
Soils Information: (1) USDA-SCS soil survey, district offices in most county seats; (2) Montana State University (MSU) Extension Service in most county seats, State Soil Specialist in Bozeman (994-4601); (3) MSU Department of Plant, Soil and Environmental Sciences (994-4601).

Ground Water Information: (1) Montana Bureau of Mines and Geology in Butte (496-4155), in Billings (657-2938); (2) United States Geological Survey in Helena (449-5225); (3) Montana Department of Health and Environmental Sciences, Water Quality Division (444-2406); (4) Montana Department of Natural Resources and Conservation, Water Resource Division (444-6601).

Pesticide Information: (1) Montana Department of Agriculture, Agricultural Sciences Division. Headquarters: Helena (444-5400), Regional offices: Billings (652-3615), Bozeman (587-9067), Great Falls (761-0926), Glasgow (228-9510), Missoula (329-1340); (2) MSU Extension Service offices in most county seats, Pesticide Specialist in Bozeman (994-3518); (3) US EPA Montana Office in Helena 457-2690).

Directions for Use of the RAVE Score Card

The RAVE score card can be completed in a matter of minutes. On a separate sheet of paper write down the appropriate value for each of the nine factors listed on the score card. For example; at a sprinkler irrigated site the "Irrigation Practice Factor" would be assigned a value of 7. Once all of the factors have been assigned a value, total all values. This total should then be compared to the Score Card Interpretation Scale to determine the relative vulnerability of ground water to contamination by an individual pesticide. Higher scores indicate higher vulnerability of ground water to pesticide contamination. If a high score is received, select an alternative pesticide and compare the results.



THE RAVE SCORE CARD

DEPTH TO GROUND WATER:	
*2-10 ft	20
10-25 ft	12

25-50 ft	5		
> 50 ft	0		_____
DISTANCE TO SURFACE WATER:			
1-100 ft	5		
100-500 ft	3		
> 500 ft		2	_____
TOPOGRAPHIC POSITION:			
Floodplain	15		
Alluvial bench	10		
Rolling foothill	5		
Upland plain		2	_____
SOIL TEXTURE:			
Gravelly	15		
Sandy	15		
Loamy	10		
Clayey		5	_____
PERCENT SOIL ORGANIC MATTER:			
0-1%	5		
**1-3%	3		
> 3%	2		_____
IRRIGATION PRACTICE:			
Flood irrigated	10		
Sprinkler irrigated	7		
Non-irrigated	2		_____
PESTICIDE APPLICATION FREQUENCY:			
> 1/year	5		
1/year	2		_____
PESTICIDE APPLICATION METHOD:			
Soil applied	5		
Foliar applied	2		_____
PESTICIDE LEACHING INDEX:			
***High	20		
Moderate	10		
Low	5		_____
Total ALL Rankings for the field and pesticide in question here:			_____

* If water table < 2 feet deep, applications should probably not be made

** If unknown, use this value

*** See Table 1 for herbicide leaching index

Interpretation of RAVE Scores

The RAVE score card rates aquifer vulnerability on a scale of 30 to 100 for individual application sites and pesticides. Higher values indicate high vulnerability of ground water to contamination by the pesticide used in the

evaluation. Those values greater than or equal to 65 indicate a potential for ground water contamination. In such instances alternative pesticides should be sought which have a lower leaching potential. Scores of 80 or greater indicate that pesticide applications should not be made at this location unless an alternative product greatly reduces the score. Scores between 45 and 64 indicate a moderate to low potential for ground water contamination and scores less than 45 indicate a low potential for ground water contamination by the pesticide in question. Even in such cases, careful use of pesticides and following label instructions is imperative to protect ground water.

Table 1. Pesticides potentially used in Bighorn Canyon NRA with an example trade name and relative pesticide leaching potentials.

Herbicide	Leachability
clopyralid (Stinger, Curtail)	high
dicamba (Banvel,Vanquish	high
diuron (Karmex)	med
glyphosate (Roundup)	low
imazapic (Plateau)	high
metsulfuron methyl (Ally, Escort)	high
picloram (Tordon)	high
sethoxydim (Poast)	low
sulfometuron methyl (Oust)	med
tebuthiuron (Spike)	high
triclopyr (Garlon, Redeem)	med
2,4-D	high
2,4-D amine (Curtail)	high
2,4-D ester (Curtail M)	high

Ratings Determination

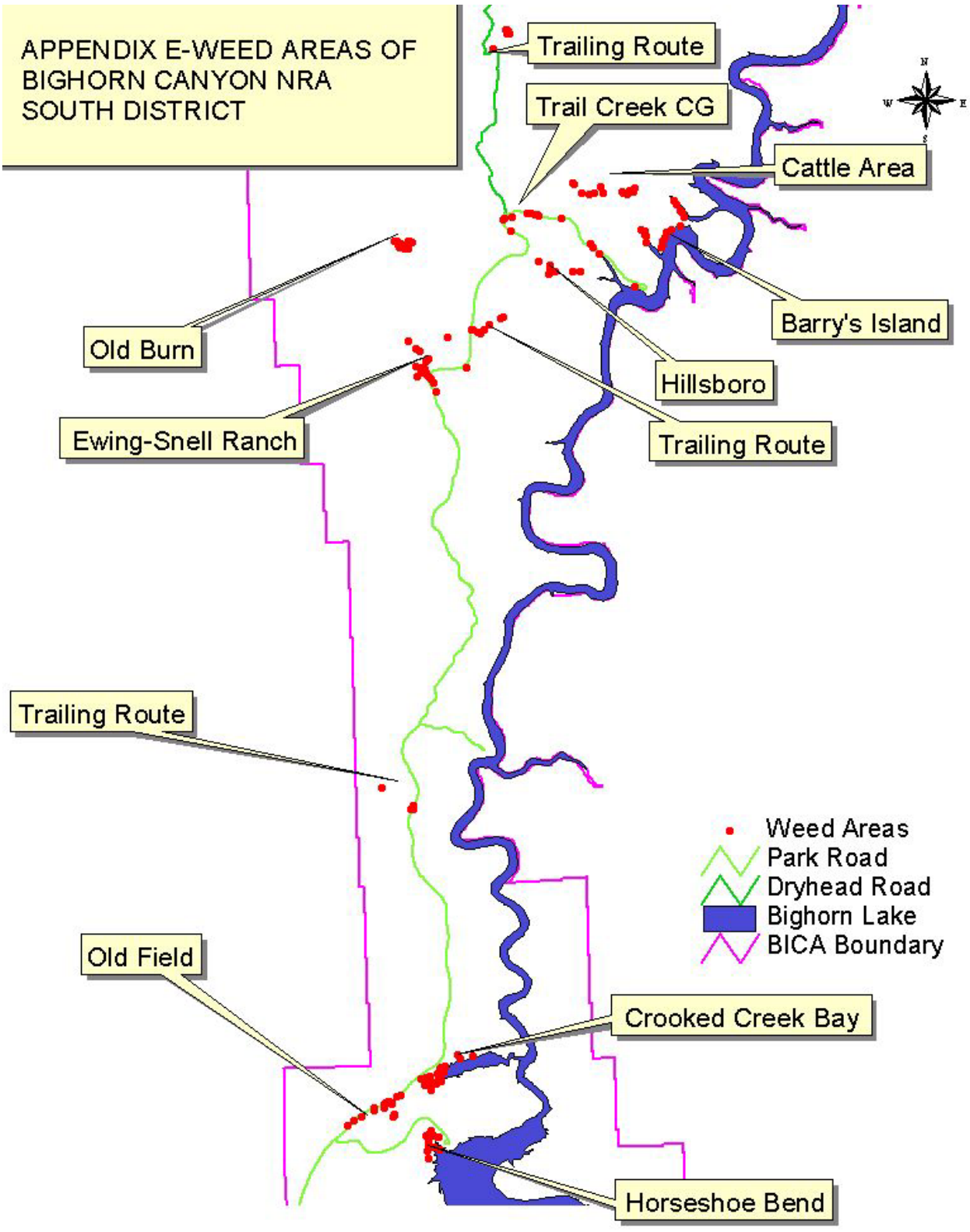
Montana Department of Agriculture
George Algard

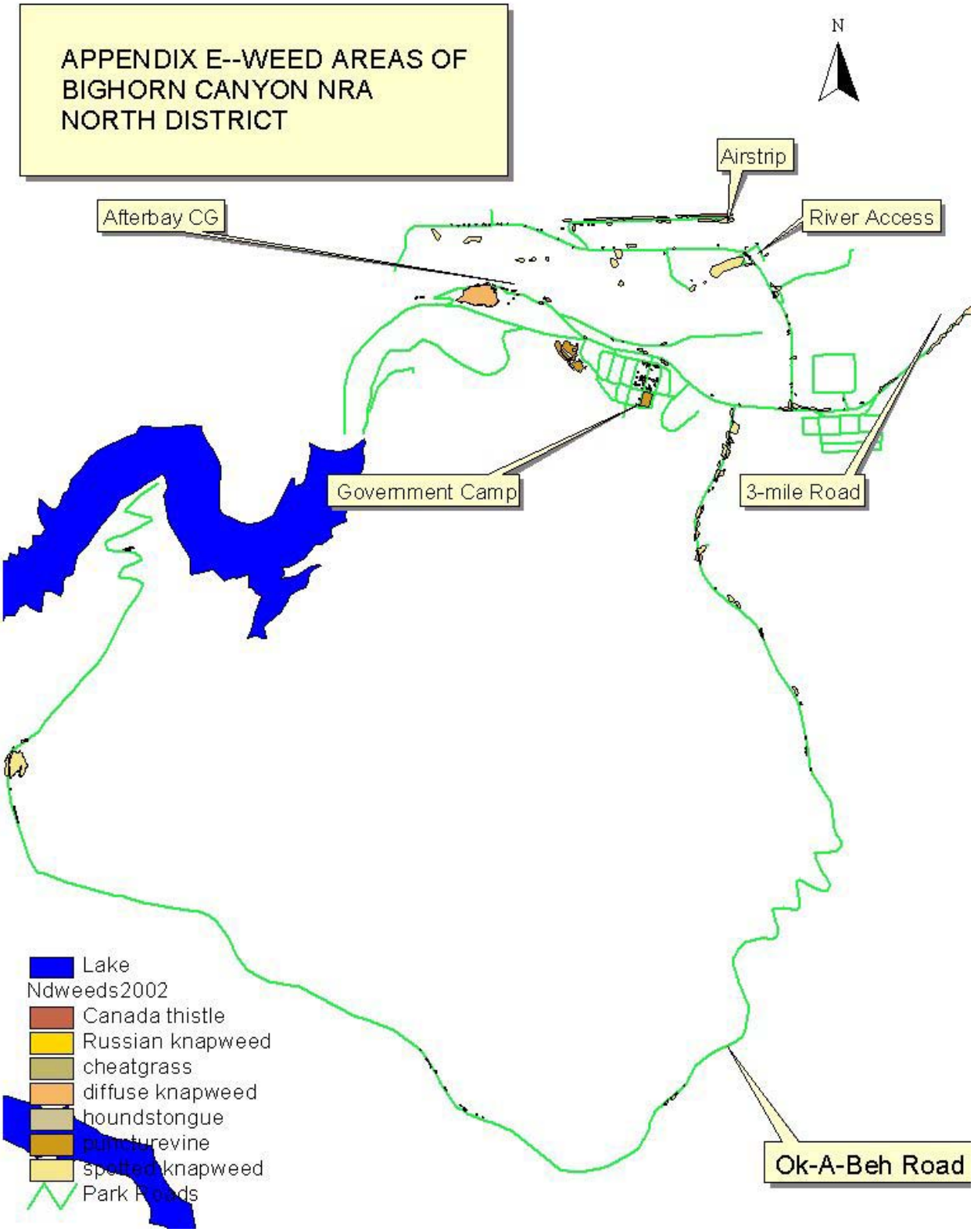
Montana State University, Extension Service
Jeff Jacobsen
Greg Hester

Prepared by: Tom DeLuca and Phil Johnson
Updated by : Donna Rise and David Rise

Montana Department of Agriculture,
Agricultural Sciences Division,
Helena, MT 59620-0201

MDA Technical Bulletin 90-01A


APPENDIX E-WEED AREAS OF
BIGHORN CANYON NRA
SOUTH DISTRICT
Trailing Route
Trail Creek CG
Cattle Area
Barry's Island
Old Burn
Hillsboro
Ewing-Snell Ranch
Trailing Route
Trailing Route
Weed Areas
Park Road
Dryhead Road
Bighorn Lake
BICA Boundary
Old Field
Crooked Creek Bay
Horseshoe Bend


APPENDIX E--WEED AREAS OF
BIGHORN CANYON NRA
NORTH DISTRICT
N
Airstrip
Afterbay CG
River Access
Government Camp
3-mile Road
Ok-A-Beh Road
Lake
Ndweeds2002
Canada thistle
Russian knapweed
cheatgrass
diffuse knapweed
houndstongue
puncturevine
spotted knapweed
Park Roads

APPENDIX F: POTENTIAL T&E SPECIES AND SPECIES OF SPECIAL CONCERN

Common Name	Scientific Name	Status	Situation in Bighorn Canyon NRA
Leopard Frog	Rana pipiens	Sp of Concern	Wetlands
Milk Snake	Lampropeltis triagulum	Sp of Concern	Seep wetlands
Sturgeon Chub	Hyyybopsis gelida	Candidate	Bighorn River well away from area
Bald eagle	Haliaeetus leucocephalus	Threatened	Covered by this EA Cottonwoods and side canyons
Mountain plover	Charadrius montanus	Candidate	One sighting in grasslands ,migrant
Northeren Goshawk	Accipter gentiles	Sp of Concern	Only, gone before weed treatment May winter in yellowtail habitat, well
Peregrine falcon	Falco peregrinus	Recently Delisted	Away from area covered by EA Canyon cliffs and east face of Pryors
Sharptail Grouse	Tympanuchus phasianellus	Sp of Concern	Well away from weeds Grasslands in North District
Black footed ferret	Mustela nigripes	Endangered	Not found in Bighorn Canyon
Black-tailed prairie dog	Cynomys ludovicanianus	Candidate	No suitable habitat Not found in Bighorn Canyon
Canada lynx	Felis Lynx	Threatened	Not found in Bighorn Canyon
Hoary bat	Lasiureus cinereus	Sp of Concern	No suitable habitat Found in caves away from weeds
Long–eared myotis	Myotis evotis	Sp of Concern	Found in caves away from weeds
Merriman’s shrew	Sorex merriami	Sp of Concern	Found in Middle Pasture in black sage steppe away from weeds
Spotted bat	Euderma maculatum	Sp of Concern	Found in Caves and Visitor

Center wall, away from weeds

Swift fox Vulpes velox Candidate
Not found in Bighorn Canyon NRA

No suitable habitat
Townsend's Big-eared Bat Corynorhinus townsendii Sp of Concern Caves away from weeds

Sullivantia Sullivantia hapemanii Sp of Concern
Found in calcarious seeps, may be near

Canada thistle at Hillsboro
Persistant sepal Rorippa calycina Sp of Concern
Found along Bighorn River South of
Yellowcress
lake, away from target area
Bighorn daisy Erigeron allocotus Sp of Concern
Away from weed areas

Hairy Prince's plume Stanleya tomentosa Sp of concern Away from weed areas

Oregon milkvetch Astragalus oreganus Sp of Concern Away from weed areas

Rabbit buckwheat Eriogonum brevicaule Sp of Concern Away from weed areas
var. canum